ELECTRICAL REVIEW

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Power Station Sites

The Ministry of Works' Statement

MORE uncertainty and delays are usually incurred in the acquisition and preparation of sites for power station buildings than in the manufacture of the electrical and mechanical equipment. Good sites are fundamental necessities. It is, therefore, gratifying to receive the assurance of the Ministry of Works, as reported by us last week, that full advantage is being taken of the first priority accorded by the Government to the construction and extensions of generating plant in getting the initial site work well in hand.

Co-ordinated Programme

In commenting on the Ministry's announcement, *The Times* says that this building work, if completed in two years, seems certain to outstrip the output of generating equipment. The risk in our view is not a serious one. Site work needs to be started many months before plant can be installed and there seems no reason to doubt the official statement that the building programme is co-ordinated with the engineering production programme of the Ministry of Supply. Developments now in hand are the result of designs that necessarily matured perhaps four years ago with full understanding by the Central Electricity Board and the supply undertakings of their urgency and the only thing to be done about them now is to proceed with their execution with all despatch.

Our contemporary, following a reference to the probability of load shedding next winter, asks whether the new plants are to be sited in areas where they will secure the greatest concentration on export and whether they will be linked up with district heating schemes. The answer to the first question is that stations are erected as near to load centres as may be practicable, having regard to the need for abundant supply of water and for sea, rail or road access for coal and other goods from not too distant sources. It is the function of the grid to make the electricity produced there available at the points of utilization.

The second question is related to the type of plant that can be most rapidly constructed to meet the present emergency with overall economy in operation, which was discussed in our issue of July 11th. To adapt such plans to the requirements of district heating would preclude the use of standard designs and, as it has been stated in the House of Commons, would seriously hold up production. Moreover district heating is a long-dated conception, the feasibility of which on any material scale has yet to be determined, and would in no case provide a cure for present troubles.

Avoidance of Delays

The Ministry of Works' statement covers past arrangements only—those due for completion by 1950. What is now probably the chief preoccupation of those responsible for providing the 1½ million kW or so of generating plant that will be required each year during the next decade is the securing of technically suitable sites. These are scarce, and in too many cases attempts are made during long drawn-out public inquiries to impose conditions for their use that would make economical generation impossible. Complaints are also

heard of time lost through complexities in the routine of obtaining official sanctions, but it is hoped that the recently revised departmental planning procedure will improve matters. For the future, this seems the crux of the matter, since in the speedy execution of well considered plans for the erection and extension of power stations lies the best promise of meeting the nation's most urgent economic needs. To this end the acquisition and preparation of sites without undue delays are essential preliminaries.

Coal Stocks

As a "target" for the end of the summer, the six winter weeks' reserve of coal at electric power stations seems satisfactory. It is the amount given in our issue of March 7th, when we discussed the lessons of the coal crisis, as the minimum necessary. Thereafter deliveries should be such that stocks do not fall below about three weeks' supplies by the end of March. The stock at the beginning of this month, 3,127,000 tons, referred to by the Minister of Fuel as 4½ weeks' supply, is a big improvement over the 1,476,000 tons at this time last year, but there is still a gap of over a million tons to be filled by October.

Output and Peaks

ELECTRICITY generated in June, 2,842 million kWh (2,676 million sent out), was only 2·9 per cent more than in June, 1946, according to the Electricity Commissioners' returns. This was well below the 5·9 per cent increase for the first six months of the year, represented by 21,656 million kWh (20,442 million sent out). The effect of the weather is obscure, and weekly variations in the amount of fuel burned at power stations and at gas works showed dissimilar trends. While some saving in fuel has doubtless been due to weather, the effect on the aggregate maximum demand during critical periods of plant overhaul cannot be gauged without corresponding particulars of load factor.

Photometric Values

A DEFECT of the international candle (introduced in 1909), which is not backed by a primary standard, is that luminous intensities at different colour temperatures are not strictly comparable on the basis of the international luminosity curve adopted in 1924. The change at the beginning of next year to the "new candle," which takes as its standard a brightness of 60 new candles per sq cm for a black body radiator at the temperature at which platinum solidifies will not mean much in practice. At the colour temperature of the new standard, 2,046 deg K, new candles will be only about 1·7 per cent higher than the old; at 2,306 deg K the difference falls to within 0·5 per cent; at the higher colour temperatures of gas-filled lamps new candles will be lower. The alteration in the basis of colour comparison prevents the use of conversion factors between the two standards.

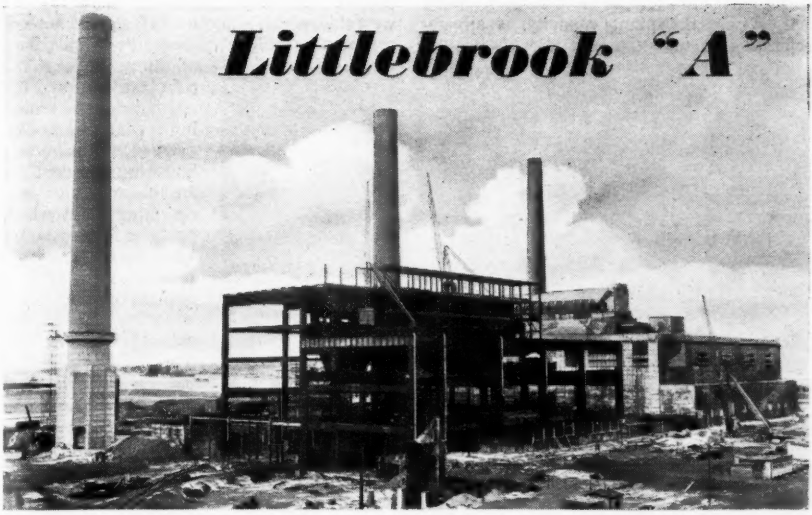
Staggered Hours

ON Tuesday the Minister of Labour announced the Government's plans for securing the staggering of working hours in industry to safeguard the supply of electricity. Difficulties are inevitable, but as Mr. Isaacs pointed out the alternative would be for industry to be crippled by almost daily power cuts. Any firms failing to respond can be compelled under the Defence Regulations to reduce their demands, and penalties of a fine and/or imprisonment, may be imposed for non co-operation. The scheme is due to be put into operation on October 1st.

Shape of Things

IN a statement last week on the economic situation Mr. Herbert Morrison gave the heartening news that our exports in June reached a higher value than at any time since December, 1920. Both dates, significantly, are two years after the end of a war. This time we must aim much higher if we are to achieve a stable national economy. References have been made to the approaching end of the "seller's market" and greater competition from the United States. On this latter point recently published figures of American electrical machinery exports in the first three months of this year make it apparent that this position is being reached, for the total value of over $127 million compares with only $61 million in the corresponding period of last year. It is therefore essential that however urgent are our home needs part of manufacturers' capacity should be maintained on export trade.

Littlebrook "A"

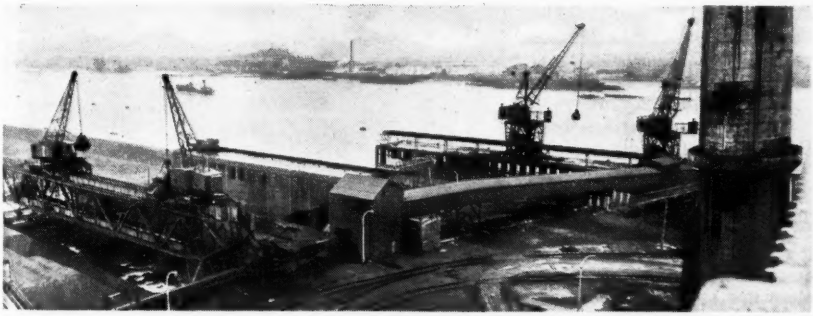


Layout and Operational System

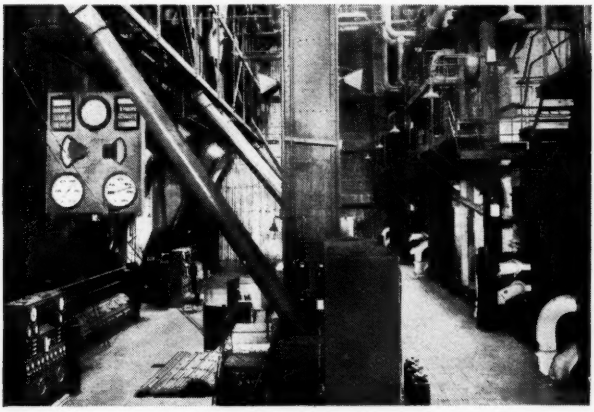
THE Littlebrook "A" generating station of the Kent Electric Power Company is not in the same category as some of the power stations we have described since the war, i.e., those which were specially erected to meet wartime conditions, although it was not put into commission until the war had started. The wartime censorship regulations and, later, the A.R.P. structures have prevented us from publishing a satisfactory illustrated description of the power station earlier, although in the *Electrical Review* of December 23rd, 1938, there was a brief constructional description of the station.

The Kent Electric Power Co.'s Littlebrook "A" station is now complete with its full plant capacity (120,000 kW) and the "B" station is beginning to take shape. The station is mainly dependent on water-borne coal which is received at the jetty and passed by conveyor and transporter bridge to the storage ground

The station is now complete with its full designed plant capacity of 120,000 kW, comprising one 60,000-kW and two 30,000-kW turbo-alternator sets, and three pulverized-fuel-fired and three stoker-fired boilers, each of 256,000 lb per hour m.c.r. capacity. The operational tendency is to employ the large turbo-alternator and the p.f. boilers for base-load, and the two 30,000-kW sets and stoker-fired boilers for the peak loads.



Actually the second "B" station, which will double the plant capacity, is already beginning to take shape, and with its two



Boilers disposed in two side-by-side lines—pulverized-fuel at the north and stoker-fired at the south

60,000-kW turbo-alternators and four 350,000-lb per hour boilers this station will represent a very considerable advance in steam reheating practice. A pair of boilers will operate with each turbo-alternator on the unit system, and the initial steam conditions will be 1,235 lb per sq in. and 825 deg F. The exhaust from the high-pressure section of each turbine at 555 deg F and 369 lb per sq in. will, however, be passed on to the reheater sections of the boilers, in the flue-gas circuit after the secondary superheater, where the temperature will be raised again to 825 deg F before it is passed on to the i.p. section of the turbine.

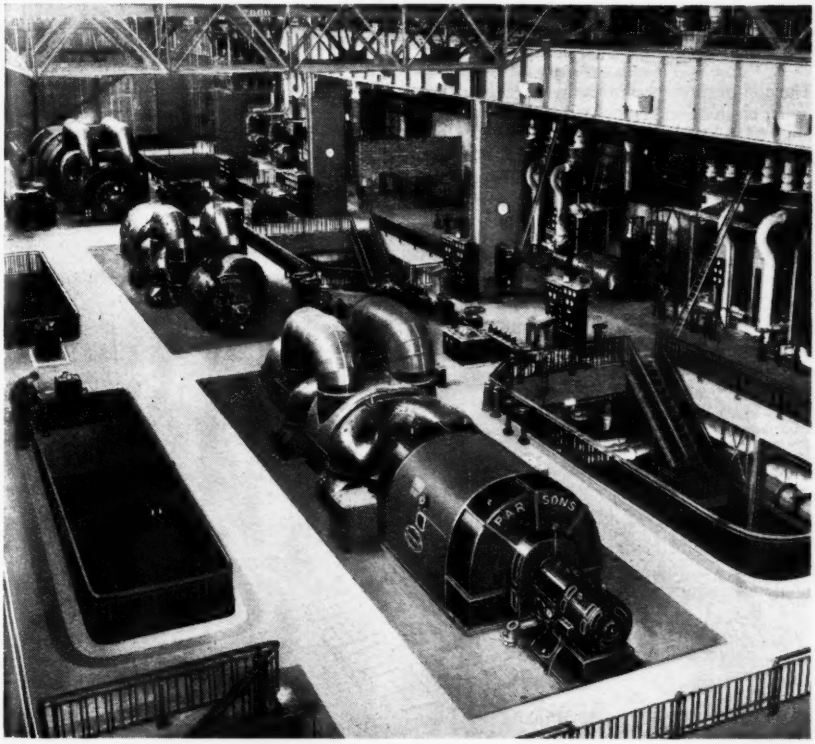
But our aim in the present article is to deal with Littlebrook "A" station. The site is on Stone Marshes, near Dartford, on the south bank of the Thames, and the station runs roughly longitudinally north and south. The turbine house, which is about 320 ft long and 100 ft wide, is on the east side. The three turbo-alternator sets are aligned end-to-end. The adjacent boiler house on the west side, which is about 180 ft square, accommodates its boilers in two side-by-side lines of three boilers, the p.f. boilers at the north and the stoker boilers at the south.

Outside the boiler house on the north is an electrostatic precipitating plant which operates in association with the p.f. boilers. Just off each westerly corner of the boiler house is a concrete chimney, cast *in situ*, one for each line of boilers, but there will be a flue interlink between the chimney off the south-west corner and the one now under construction for Littlebrook "B." Some 200 ft to the west of the main buildings is the coal storage ground which has a capacity of 28,000 tons, and to the north of the storage ground is the circulating-water pump house.

The station is mainly dependent on water-borne coal which is received at a ferro-concrete jetty roughly in line with the coal store. Two Stothert & Pitt travelling and luffing cranes on the jetty, each with an average unloading rate of 100 tons per hour, deposit the coal on to a transverse belt conveyor on the jetty, and from this the fuel is passed on to a main conveyor which runs

Two of these roller mills serve each of two of the p.f. boilers

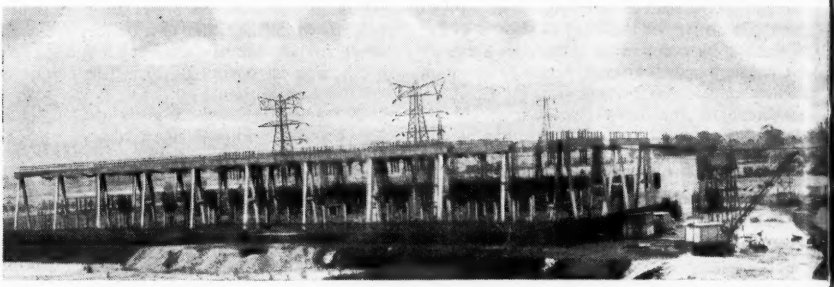
along the east side of the coal store. From the main conveyor the coal is passed either to storage by a conveyor system on a Fraser & Chalmers travelling transporter bridge with a track span of 200 ft over the storage ground, or direct to the boiler-house bunkers by two underground conveyors and bucket elevators. There are two cranes on the transporter bridge for reclaiming purposes. The rail-borne coal is fed on to the main conveyor via a Henry Lees 20-ton wagon tippler. A comprehensive system of railway sidings surrounds the station site and is served from the London-Dartford line of the Southern Railway.



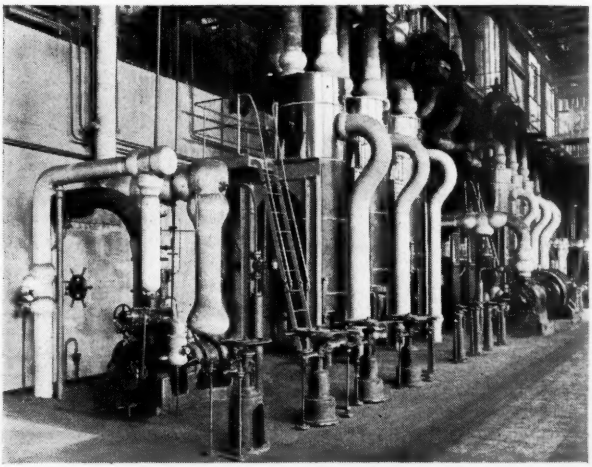
The three turbo-alternators are aligned end to end

Coal for the International p.f. boilers is fed from the boiler-house bunkers to pulverizing mills in the boiler-house basement. One boiler is served by two Kennedy horizontal ball mills, each with an output of 19,500 lb per hour at 8 per cent moisture content, while the other two boilers are each served by two International roller mills, each mill having an output of 20,160 lb per hour at 8 per cent moisture content. A horizontal table feeder serves each mill, and in each case the powdered fuel is carried to the boiler burners, via revolving classifiers for Nos. 3 and 5 boilers, in an air stream created by an a.c. variable-speed motor-driven fan. There are four I.C.L. burners per boiler, one at each corner of the combustion chamber, as well as four similarly disposed atomizing burners, for starting up, which receive their oil from pressure-type pumping units fitted with thermostatically controlled electric heaters.

The combustion chamber of each boiler has a volume of 13,700 cu ft, and the walls are water cooled by " Murray " finned tubes.



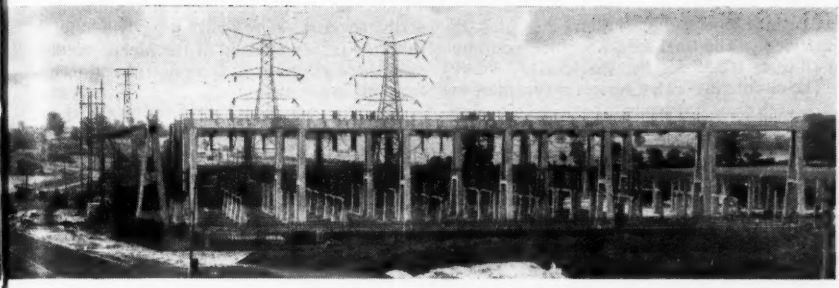
The combustion gases are carried through the boiler circulation system, which has a heating area of 4,120 sq ft, through a " Melesco " multi-loop type superheater (11,300 sq ft), in association with which there is " Kent " desuperheater control, then through the high temperature " Senior " economizer (6,863 sq ft), the high temperature air heater (10,710 sq ft), to the low temperature economizer (9,680 sq ft) and the low temperature air heater (46,980 sq ft), the exit gas temperature being 240 deg F, and the final air temperature 500 deg F. Two forced-draught and two induced-draught two-speed motor-driven fans are employed for this purpose. Finally the discharged gases pass through the Sturtevant precipitators and on to the chimney. Ivor soot blowers throughout the boilers operate at the full boiler steam pressure.



Feed-water pumps and h.p. feed heaters disposed at the turbine operating floor level

Coal for the Babcock & Wilcox stoker-fired boilers is fed direct from the boiler-house bunkers to the boiler hoppers which serve the Ward-Leonard controlled twin chain grates of each boiler which have an area of 660 sq ft. The combustion chamber of each boiler has a volume of 11,050 cu ft, and Bailey water-cooled walls. The boiler circulation system presents an area of 22,055 sq ft to the gases from the chamber, the superheater 8,900 sq ft, the economizer 19,300 sq ft, and the air heater 16,650 sq ft. The exit gas temperature at the air heaters is 300 deg F. In each boiler two f.d., two i.d. and two s.a. fans serve the air circuit indicated; the f.d. and i.d. fans are driven by two-speed motors. Finally the gases pass through Davidson dust collectors.

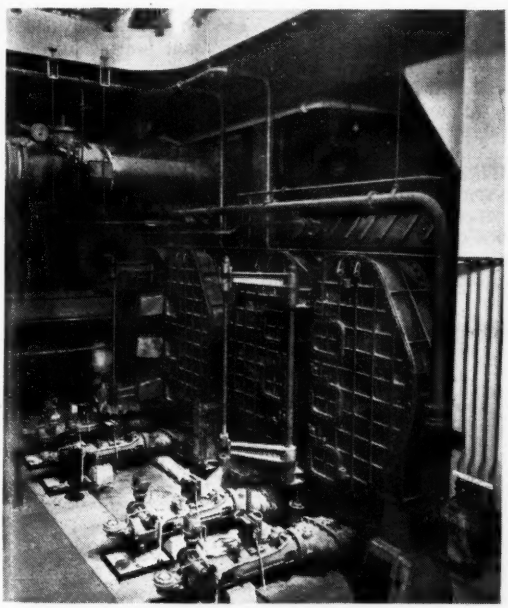
Babcock & Wilcox soot blowers serving the combustion chamber and economizer operate at 350 lb per sq in., while those serving the circulation system and the superheater operate at 160 and 100 lb per sq in. Ashes from the combustion chambers of all six boilers are removed by a " Hydrojet " sluice system which embraces two centrifugal motor-driven ash pumps. After settling, the ashes are finally disposed of at present actually on the station site.



C.E.B. compounds further south contain the 132-kV compressed-air-operated gear

The water and steam circuits in all the boilers are served by a common feed-pump installation consisting of four high-pressure two-stage "Medivane" motor-driven feed pumps, with three steam-turbine driven stand-by pumps. Normally two of the working feed pumps operate in conjunction with the 60,000-kW turbo-alternator, and the others with the two 30,000-kW sets; in each case the pump takes the water from the l.p. feed-water heaters and passes it through the h.p. feed-water heaters, the economizer, the boiler circulation system and, finally, as steam, the superheater where the exit temperature and pressure are 825 deg F and 625 lb per sq in. Each p.f. boiler has four drums in the circulation system, and each stoker boiler has one.

The 60,000-kW turbine is a B.T.H. machine, and the two 30,000-kW sets are by Parsons. The design steam conditions for all three sets are 600 lb per sq in. and 800 deg F, with a 1 in. Hg vacuum. The turbines are all two-cylinder units, but the largest has a single exhaust to the condenser, and the two smaller ones double exhausts. All the turbines are bled for feed-water heating—five stages in the case of the larger machine and four in each of the smaller ones.

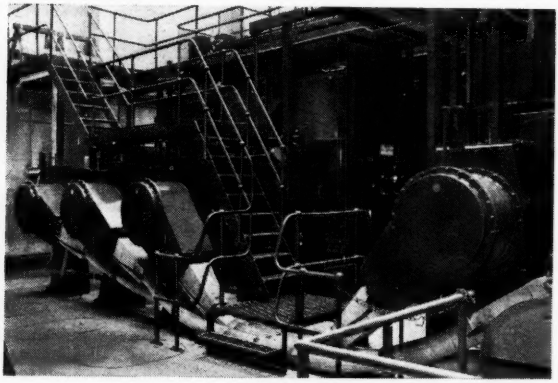


Twin-unit condenser of the larger set with two sections to each unit

The Vickers-Armstrong condenser of the 60,000-kW turbine is a twin-unit equipment, with each unit arranged in two sections, so that a quarter of the condensing capacity can be taken out any time for cleaning. The Hick-Hargreaves condensers of the smaller turbines are each of the straight twin-unit type, and it is possible to operate at nearly full load on each unit. The condensers of all three turbines each have two ejectors—a three-stage condensate-cooled equipment and a two-stage c.w. cooled unit. In each case an extraction pump passes the condensate on to the l.p. feed heaters in the basement, and the feed pump at the turbine-house operating-floor level

passes it on to the h.p. feed heaters, also at the turbine operating-floor level, as already described. The final feed-water temperature in all cases is 355 deg F.

The circulating-water system is common to all the condensers. The water is drawn directly from the river through a tunnel to Brackett rotating-band screens in the river bank, and on to the c.w. pump house where there are two 24,000-gal. per min and two 42,000-gal. per min pumps (37-ft head in all cases), while the fifth and sixth pumps are now being erected because the pump house will be common to both stations.



The 66-kV compressed-air operated switchgear is in two switch-houses to the south of the station

The 30,000-kW alternators generate at 13·2 kV and are directly connected to 36,500-kVA delta-star connected transformers serving 66-kV compressed-air operated Reyrolle switchgear in duplicate switch-houses 800 ft or so to the south of the station. The alternator switching is thus effected directly at 66 kV and is initiated in a control house about 100 ft south of the switch-houses, but in an emergency switching can be carried out in each of the switch-houses.

The 60,000-kW alternator generates at 15 kV and is directly connected to a 73,000-kVA delta-star connected transformer serving 132-kV compressed-air-operated outdoor Metrovick switchgear in the C.E.B. compounds still farther south. The alternator switching in this case is also effected at the higher voltage direct and normally in the control room, but from its own relay room in an emergency.

The main transformers are equipped for 2·5 and 5 per cent off-load tapping, and they are forced-oil cooled with fan cooling for the oil. The 132-kV and 66-kV systems are interconnected through two 45,000-kVA, 132/66-kV star-star and tertiary connected transformers. To each alternator is also solidly connected a unit transformer with a 6-kV secondary, and associated with each of these is a 6-kV unit reactor with a 4 per cent reactance. There are also three 350-kVA, 6-kV/400-V delta-star connected unit auxiliary transformers, as well as two 10,000-kVA, 66/6-kV star-star connected station transformers solidly connected to the 66-kV sides of the 132/66-kV interconnector transformers. Each station transformer serves a distribution board, both of which can be coupled, and the station transformers can also supply the unit switchboards via reactors.

We are indebted to Mr. W. J. H. Wood, joint general manager of the company, for permission to visit the station and to publish this article, also to Mr. A. S. Helms, station superintendent, and his deputy Mr. E. C. Avery, for their help in obtaining the information and photographs.

Normally the alternator switching is effected in a control room south of the 66-kV switch-houses

Motor Design and Power Factor

Points Which Need Attention

By H. Sparke,
Mem.A.I.E.E.

INDUCTION motors rarely have a full-load power factor of more than 0·9, and for the greater part of the load cycle operate at a much lower figure, although supply authorities encourage high power factors. The two main causes contributing to low power factor are stator and rotor leakage reactance and reactive lagging magnetizing current (necessary to create the magnetic flux).

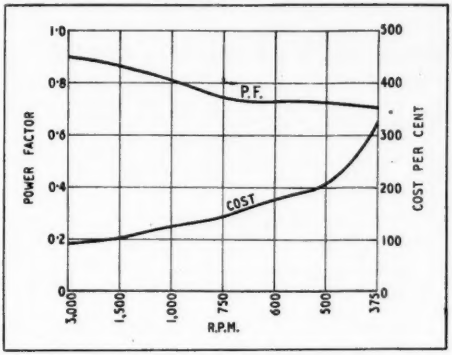


Fig. 1.—Comparative capital cost and normal full-load power factor of motors of various speeds

At normal full-load speed, magnetizing current is very much more important than leakage reactance. Relatively speaking, the magnitude of the active current and magnetizing current control the value of the power factor. Fig. 1 shows the effect of power factor and the capital costs of motors with different numbers of poles.

Fig. 2.—Simple circle diagram

In order to minimize magnetizing current, the gap length must be as small as possible, since the greater portion of the ampere turns are required for the gap. The conditions for maximum power factor are shown in the simple circle diagram (Fig. 2), where OC represents stator current at normal full load drawn at a tangent to the circle ACFB. ϕ is now at a minimum, therefore the power factor is at a maximum. OA is the magnetizing current and OF is the short-circuit current. The short-circuit current, and therefore the circle diameter, is determined by the leakage reactance of the motor; consequently the maximum power factor, cos ϕ, is the greater when OA is small.

The whole performance of the induction motor is directly influenced by leakage reactance, comprising zig-zag leakage, flux leakage across the slots, and overhang leakage, all for both stator and rotor.

The magnitude of the flux density is important, and to carry a high flux the air gap must have as much of its circumference of iron as possible, which is accomplished by narrow slots and wide teeth tending to restrict the leakage to a minimum. The amount of zig-zag leakage is fixed by the

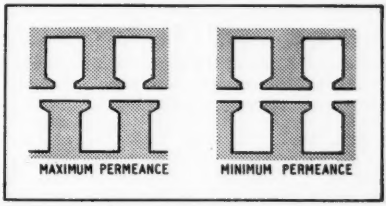


Fig. 3.—Variation of zig-zag leakage faults with relative positions of rotor and stator

permeance of its path, as are also all other flux leakages, and varies with the positions of stator and rotor with respect to teeth position.

Estimation of leakage reactance during design is difficult owing to the many doubtful quantities involved, and figures must necessarily be based upon empirical conclusions. Since the flux of zig-zag and slot leakage does not link with both windings, self

induction is the result, and self induction in this case is a loss. From the design data available it is generally possible to arrive at an average value of reluctance around the air gap, according to the various relative positions of stator and rotor teeth, due regard being paid to experience of past design test results.

The first consideration for tooth ripple is to have the pole arc and the tooth pitch so constructed that as regards mechanical dimensions, there is always the same total tooth-top area under the pole face (Fig. 3). Such an arrangement, however, must not be supposed to eliminate the ripple, for there will still be a retarding effect upon the rise and fall of flux due to hysteresis and eddy currents within the tooth iron. Secondly, tooth ripple can be suppressed by skewing the slots by one slot pitch of either stator or rotor, or by chording the winding.

The overhang of coil ends, and connectors will also account for additional leakage flux, again adding to the total reactance, and in considering the choice of a suitable winding, a two-layer arrangement has an overhang leakage of approximately 0·7 of a single-layer winding.

Swedish Measurements Conference

Papers Reviewing Recent Developments

MORE than 400 delegates from various countries attended the Conference on Instruments and Measurements in June at Stockholm, Sweden, in association with which there was an international exhibition of instruments and laboratory equipment. The fifty papers submitted were divided in five symposia respectively concerned with industrial spectroscopy, the testing of materials and mechanical measurements, process control, metrology and miscellaneous subjects. It is stated that the full full texts of the papers are to be published in January, 1948.

According to the National Physical Laboratory (D.S.I.R.) the nine papers in the industrial process-control group included one by L. von Hámos on theoretical and experimental methods of studying closed-cycle systems of automatically controlling pressure, temperature, voltage, frequency, liquid level, fluid flow, speed, angular position, etc., indicating how the analogy between such systems and electrical networks rendered it possible to study complicated examples by their electrical models.

A paper (German) by J. J. Struder dealt with systems developed in Switzerland, while automatic regulation of chemical processes was described by H. M. Schmitt, who presented a second short paper on a continuously balanced thermo-electric potentiometer pyrometer named " Electronik " (Brown Instrument Co., U.S.A.) which utilizes a thermo-couple input " signal," chopped by a vibrating reed and amplified, with a two-phase a.c. motor for operating a uniform slide wire and re-balancing the potentiometer.

The need for improving the efficiency of industrial and domestic heating systems was pointed out in a paper (Swedish) by H. von Hortenan, while different ways of automatically controlling temperature in American industries were explained by E. B. Estabrook, as well as devices made by the Leeds & Northrup Co., U.S.A. The latter included means of actuating fuel valves pneumatically and electrically; also electric furnace controllers, one of which employs a saturable reactor for continuously varying the input. Means of reducing time-lag in control systems were discussed by E. Ferner, as well as a simple electronic method of linking the measuring and controlling elements without a mechanical clamping device between the indicating pointer and controller.

Measurement for the " division " of heating costs in apartment houses was dealt with by S. Sjöstedt, who explained that instrumentation should be simple because it must be cheap for household purposes. He described calorimeters of Swedish design for measuring large quantities; thermoelectric meters for radiators only as well as evaporation meters, which are now used for hot water metering.

Experience gained in Denmark, where heat meters are installed in more than 80 per cent of all apartment houses, indicated a 30 per cent reduction of heating costs after their installation. In Sweden results from several hundred houses had already proved that considerably lower fuel costs, more even heating and hot water supplies with reduced load on the system could be achieved by metering.

Spare Parts for Southend Diesels

IN an endeavour to obtain spare parts for the Diesel engines used to generate d.c. at Southend-on-Sea the borough electrical engineer, Mr. R. C. Golding, and the Diesel superintendent, Mr. W. H. Sharp, recently visited the Continent. They flew from Rochford Aerodrome in an aeroplane piloted by Mr. Golding who holds an " A " licence. The difficulty of obtaining spare parts has been particularly acute in the case of the M.A.N. Diesel engines which were taken from German U-boats surrendered after the 1914-18 war and installed in the power station at Southend.

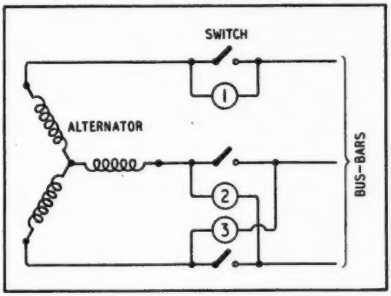
CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Paralleling Diesel Sets

IN reply to "S.L." in your issue of July 11th, the safer of the two methods of showing phase equality, i.e., bright-lamp or dark-lamp, is in my opinion the former, because a lamp at its normal voltage shows candle power changes by larger percentages than the variations in the applied e.m.f. The e.m.f. can vary considerably from zero, however, without producing any appreciable light.

On three-phase alternators, assuming them to be correctly "phased out" with the bus-bars, only one phase need be correctly synchronized. Therefore only one lamp, or set of lamps in series, is required for synchronizing. By having lamps on all three



phases, however, more useful information is obtained. One set of lamps is connected between one phase terminal of the alternator and bus-bar and the other two sets are cross-connected between the remaining two phases of the alternator and bus-bars.

Too-fast or too-slow running of the incoming generator can then be determined. When alternator and bus-bar voltages are in phase, lamp No. 1 is out and Nos. 2 and 3 are equally bright, but if the incoming alternator is too slow, the order of brightness and darkness will be 1, 3, 2 or, if too fast, 1, 2, 3.

Mechanical shocks through bad synchronizing can be very severe. If the switch is closed before the voltage is exactly in phase, a large current will flow corresponding to the out-of-phase component of the voltage between the bus-bar and incoming alternator. Should this phase difference reach 180 deg at the instant of switching, conditions are equivalent to a dead short-circuit. Conditions would be more severe than a short-circuit for the incoming alternator but less severe for alternators already on the bars, because the heavy currents will be divided among them. The power demand on short-circuit is not uniform, as it is sudden and alternates between maximum and minimum values throughout each cycle. This surge is thrown back to the rotating shaft and tends to twist and untwist it over its length, with possibly disastrous results.

*London, S.E.*24. A. M. JONES.

IN the parallel running of small Diesel-driven alternators, several aspects of a general character should be considered. In the first place, particularly as elaborate equipment cannot be used, the stand-by plant must not be paralleled with the supply undertaking's system; two-position change-over switches would ensure this positively.

Secondly, there are likely to be mechanical reasons for unsatisfactory operation in parallel, such as insufficiently sensitive governors to ensure that changes of load are equally shared; assuming the characteristics of the governors are similar, close attention to the hand-operated "speeder" gear on the engines should largely overcome this difficulty. Thirdly, synchronous operation will be easier if the alternators have been designed for parallel running.

Mechanical shocks due to incorrect synchronizing are unlikely to be severe on 30-kVA sets, but reasonable precautions should be taken at all times to reduce electrical surges; "free-handle" circuit breakers are preferably used to control the alternators.

Coming to the practical aspects of synchronizing, correct phase rotation is the first essential. Next, it is usually accepted that "lamps bright" gives the more definite indication of synchronism, but this is a matter of opinion. This method necessitates the use of a 1 : 1 potential transformer to give the required phase shift and the adoption of "lamps dark" in this particular instance should give satisfactory results, in addition to being the simplest solution.

It must be borne in mind that the voltage across the lamps rises to double the busbar voltage of 400 volts. The speed of the incoming set is, of course, adjusted by means

of the engine speeder gear. It must be ensured also that the voltage of each set is 400, and that the neutral of only one of the sets operating in parallel is closed by suitably connected neutral earthing switches. Even simple equipment should include, as a minimum, a voltmeter, wattmeter and ammeter for each set, though the wattmeter may be omitted, provided the sets are identical and exciter ammeters are available.

In parallel operation the loads, wattful and wattless, should be shared equally between the sets; the former being indicated on the wattmeter and the extent of the latter on the ammeter. The watts are determined by the Diesel engine power output and the wattless current by the setting of the exciter rheostat, preferably controlled by an automatic voltage regulator. Auto-regulators should incorporate a compound control coil to ensure equal sharing of the wattless load.

Manchester. K. W. O'HARA.

WITH reference to the letter of "S.L." in your issue of July 11th, we have had some experience in the parallel operation of comparatively small Diesel alternators. We use the "bright lamp" method for synchronizing as we find it easier to judge the correct moment than with the "dark" method, and it is rather important to wait until the bright-dark-bright cycle lasts for at least 20 seconds.

In using this method we have not yet experienced an incorrect synchronization, although the inexperienced might be alarmed by the usually very large current surges shown on the respective ammeters. This current is, of course, mainly wattless and after settling down should not amount to more than 10 per cent of the full-load current. If modern alternators which sacrifice inherent regulation for good short circuit characteristics are used, their comparatively high impedance allows considerable latitude.

A point to be watched is that increasing the excitation current does not necessarily increase the load borne by the particular alternator as this mainly affects the voltage and power factor, and it is engine speed which really governs the division of the load. As, however, the frequency is to be maintained constant, a very small difference in speed is sufficient and most governors fitted to small Diesel engines are not sufficiently critical.

We have found it best to damp the governors somewhat, as the risk of hunting is in our opinion more serious than a moderate interchange of load between the alternators on the busbars, and in any case the latter look after the load sharing very well by themselves by taking or giving out power. In our experience similarity of cyclic irregularity in the engines is of greater importance than its degree. In short, the chief requirements are confidence, commonsense and overload trips that really work.

Wembley. THE ELECTROPLANT COMPANY.
G. L. P. JONES, *Director.*

Staffing and Management

I WISH to express my appreciation of Mr. G. O. McLean's frank and intelligent article on "Staffing and Management" in your issue of July 11th. There are, however, two points on which I would join issue with him.

First, among the "interview pointers" on which he would assess the candidate for an appointment Mr. McLean includes what he calls the important aspect of "motive." I am not sure what the last word means in this context, except that it is preferable to engage an employee whose motive is that of furthering the business rather than emptying the till. Seriously, however, consideration of motive introduces highly individual moral judgments which are quite incapable of rational assessment, and which it has accordingly been the constant aim of scientific progress to avoid. One would therefore welcome an expansion of the writer's brief paragraph on "motive," especially as, though the candidate may be quite satisfactory in all other respects, we are told that "his appointment will be a failure if his motives are wrong."

Secondly, the author writes "management of staff differs little, if at all, from management of anything else." This statement may be true as far as the mechanical content of staff management is concerned, but if it implies that a successful organizer in engineering or accountancy is equally suited to be an establishment officer—as I have known managements to assume—then the implication is definitely mischievous. Every branch of human activity calls for its own appropriate corpus of knowledge, and, still more, aptitude for the particular work. The qualities which make a competent accountant do not produce an enterprising engineer, and both of these may produce an unsatisfactory staff controller. I should be glad to know whether Mr. McLean is in agreement.

London, W.C.2. HARRY J. BENTLEY, B.A. (Cantab.).

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Metropolitan Vickers Electrical Co., Ltd., announces that **Mr. G. A. Juhlin,** M.I.E.E., has resigned from the position of chief electrical engineer, but will continue to act in an advisory capacity to the managing director; he remains a director of the parent company and of the Metropolitan-Vickers Electrical Export Co., Ltd.

Mr. Juhlin was born and educated in Sweden. In 1902 he joined Dick Kerr & Co., Preston,

Dr. C. Dannatt

Mr. G. A. Juhlin

and for eight years held the position of chief a.c. design engineer. In 1915 he joined Metropolitan-Vickers (then the British Westinghouse Electrical and Manufacturing Co.), and two years later he was appointed chief engineer of the Plant Department. In 1941 he was appointed chief electrical engineer on the retirement of Mr. J. S. Peck, and in 1942 he was elected to the board of the company; he had been a director of the Metropolitan-Vickers Electrical Export Co. since 1935. Mr. Juhlin has been a member of the Institution of Electrical Engineers since 1917 and has taken a leading part in its activities. He has contributed a number of papers, chiefly on electrical machine design, and was chairman of the North Western Centre for 1923-24. He has visited the Far East, Russia and other countries on behalf of the Metropolitan-Vickers Co.

Dr. C. Dannatt, O.B.E., M.C., M.I.E.E., who has been appointed to succeed Mr. Juhlin as chief electrical engineer of the Metropolitan-Vickers Electrical Co., Ltd., received his technical education under Prof. W. M. Thornton, at Armstrong College, Newcastle, where he graduated in electrical engineering in 1921. His studies were interrupted by the 1914-18 war, during which he served in the York and Lancaster Regiment, attaining the rank of captain and being awarded the Military Cross at Messines Ridge in 1917. He joined Metropolitan-Vickers as a college apprentice in 1921 and subsequently entered the electrical and magnetic section of the Research Department, taking charge of the section in 1924. His activities have been mainly concerned with engineering investigations and he is a recognized authority on electrical measurements, especially in relation to magnetism and the behaviour of dielectrics. He is the author of numerous articles and papers to scientific and engineering societies and is principal author of "Electrical Power Transmission and Interconnection." In 1936 he was awarded the degree of D.Sc. by the University of Durham. Dr. Dannatt was appointed to the Chair of Electrical Engineering in the University of Birmingham in August, 1940, but at the request of the Admiralty he continued part-time activities with the Metropolitan-Vickers Co. In the 1943 New Year Honours he was awarded the O.B.E. for contributions to naval gunnery. He returned to Metropolitan-Vickers in 1944 as assistant to the chief electrical engineer, and in the following year he was appointed deputy chief electrical engineer.

Mr. C. Drummond, B.Sc., mains engineer at Fleetwood, has been appointed to succeed Mr. W. P. Lilwall as chief electrical engineer and manager at a salary of £895, rising to £1,053, plus cost-of-living bonus. Mr. Drummond, chosen from fifty-three applicants, has been mains engineer since 1932. He has been acting temporarily as chief engineer for a few weeks.

Mr. F. J. Head, manager of Henley's (South Africa) Telegraph Works, Co., Ltd., Johannesburg, retired on June 30th. He joined the Johannesburg branch staff in 1905, and was appointed chief assistant to the manager in 1921. In 1939 he was promoted to manager. **Mr. R. W. Lord** succeeds Mr. Head as manager. After three years' experience in the Electrical Department at Henley's Woolwich Works, Mr. Lord was transferred to the Contract Department in 1923 as a technical assistant. In 1939 he was appointed an assistant to the manager of the South Africa Co. He took up his new duties on July 1st.

Mr. R. W. Lord

Mr. W. L. Allison, M.I.A.M.A., of the Lancashire Dynamo & Crypto, Ltd., was recently elected chairman of the British Electrical & Allied Manufacturers' Association's Publicity Committee for 1947-48, in succession to **Mr. J. O. Twinberrow,** of Babcock & Wilcox, Ltd. Mr. Allison joined the Lancashire Dynamo & Motor Co., Ltd., at Trafford Park

in 1915, and has been responsible for the company's advertising and general publicity for over twenty years.

Mr. C. E. Oakes, president of the Pennsylvania Power & Light Co., has been elected president of the Edison Electric Institute.

Mr. H. E. Pawson, Montreal, was elected president of the Canadian Electrical Association at the annual convention at St. Andrews, New Brunswick, on June 21st in succession to Mr. E. V. Caton, Winnipeg.

Mr. L. B. Hutton, general manager of the Wellington Electricity and Tramways Department, is this year's president of the New Zealand Institution of Engineers. The Institution has awarded the Fulton Gold Medal to **Mr. R. S. Maunder** (Wellington) for a paper on " Electrical Installations."

Mr. R. H. Batey, lighting engineer at the Middlesbrough office of the British Thomson-Houston Co., Ltd., since 1940, has been appointed lighting engineer at the Birmingham office, where he took up his duties at the beginning of the month. While at Middlesbrough he was responsible for the formation of the Tees-side group of the Illuminating Engineering Society.

Mr. E. Martin, late general manager of Britannic Electric Cable & Construction Co., Ltd., will be staying at the Piccadilly Hotel, London, until August 25th, when he sails for South Africa to take up the position of general manager of a new company, the African Britannic Cable & Wire Corporation (S.A.), Ltd., which is to erect a large factory at Springs, thirty miles from Johannesburg, for the production of paper-insulated cables and wires.

Mr. J. A. Roddy, who formerly handled television sales for A. C. Cossor, Ltd., has now taken up the appointment of contacts officer to Cossor Radar, Ltd.

Mr. H. G. Poxon, late of R. B. Pullin & Co., Ltd., has commenced business at 33, Sudbury Court Road, Harrow, as a technical adviser on small power drives, and is developing for production, various special machines and indicating systems. Until 1946, he was technical sales manager of Klaxon, Ltd.

Mr. T. Thompson, an employee of B.I. Callender's Cables, Ltd., recently received the B.E.M. for his work at Prescot during the war. Due to retire in 1939 he volunteered to continue as leading hand on the breaking down rolls in the sheet mill. In addition to his work in the mill Mr. Thompson took his part in the works A.R.P. organization of which he was the oldest member. After over 36 years in the company's service he retired recently at the age of seventy-two.

Consequent upon the recent acquisition of the Fowler engine business by Associated British Engineering, Ltd., **Mr. R. F. Norris,** former sales manager, Oil Engine Division of John Fowler & Co. (Leeds), Ltd., has joined the sales staff of Associated British Oil Engines, Ltd. Mr. Norris was a member of the London sales organization of the Metropolitan-Vickers Electrical Co., Ltd., from 1924 to 1936.

Mr. Leslie Gamage, joint managing director of the General Electric Co., Ltd., has been re-elected chairman of the British Export Trade Research Organization for the ensuing year.

Mr. H. E. Taylor, managing director of the British General Electric Co., Ltd., New Zealand, was host, and **Mr.** and the **Hon. Mrs. Leslie Gamage** were guests, at a luncheon party given at the Connaught Rooms, London, on July 4th by the G.E.C. overseas staff now on a visit to this country. Mr. Taylor, in proposing the toast of their guests, referred to the part played by Mr. Gamage in the expansion of the export business of the G.E.C. and of the country as a whole. Mr. Gamage said that the gathering was exceptional as it was representative of the G.E.C. all over the world. Exports had increased in spite of great difficulties, but we had not yet reached the target which we must achieve if the country was to survive. The Hon. Mrs. Leslie Gamage expressed her appreciation of the kindness she had received and the friends she had made on her overseas visits with her husband, and said she hoped at some future date to visit them again.

Continuing its jubilee celebrations on July 11th the Shoreditch Borough Council Electricity Department held a social evening at the Town Hall, Old Street, E.C.1, when employees of the Department, both past and present, together with their ladies, were the guests of the chairman and members of the Electricity Committee. The Mayor and Mayoress, the chairman of the Committee, and other members of the Council also attended the function, at which over 400 spent an enjoyable evening.

Ferranti golfers had an enjoyable evening recently when thirty members of the staff from the Hollinwood and Moston factories played for the transatlantic trophy presented for annual competition by Mr. V. Z. de Ferranti. The competition is played simultaneously in England, Scotland and Canada, the Hollinwood and Moston staff playing over the course of the Blackley Golf Club, Manchester, Edinburgh staff at Gullane, London staff in London and the Canadian members at Toronto. **Mr. A Waddell,** of Edinburgh, was the winner with a score of 69 net, and he will hold the trophy for one year with a replica for permanent retention.

The annual sports and gala of the Victoria Works Athletic Club of Johnson & Phillips, Ltd., was held at the company's sports ground at Kidbrooke on July 12th, and about 2,000 employees and friends attended. A long programme and plenty of sunshine provided an enjoyable day. A championship cup presented by J. Stone & Co., Ltd., to be competed for annually by local firms, was won appropriately by Stone's Athletic and Social Club. Competing

firms were Harvey's Sports, U.G.B. Sports, Stone's Athletic, Telcon Sports, Metrogas and Victoria Works Athletic Club. The inter-departmental challenge shield (presented by the management of Johnson & Phillips, Ltd.) was won by the Employment and Welfare Department. At the close of the evening the prizes were presented by Mrs. G. Leslie Wates, wife of the chairman and joint-managing director of the company. Dancing on the lawn rounded off a successful gala.

At the annual sports meeting of Bruce Peebles & Co., Ltd., held recently, honours went to the transformer shop team which won the inter-departmental shield. The rather inclement weather did not deter a good turnout of the employees with their families and friends, and they were rewarded with a programme of varied events which were well contested. Among the guests were the company's chairman, Sir William Y. Darling, M.P., Mr. J. W. Rodger, managing director, and Mrs. Rodger. At the close of the sports Mrs. Rodger presented the prizes.

An inter-Corporation bowls match took place recently between the Electricity Department staffs of Cardiff and Swansea Corporations, Swansea winning by 115 shots to 95. The visitors were entertained to lunch by **Mr. Hampton E. Blackiston,** the chief engineer and manager at Swansea, and were later entertained to tea by Ald. H. Davies, Mayor of Swansea.

Obituary

Mr. Lachlan Mackinnon.—We regret to learn of the death of Mr. Lachlan Mackinnon, former general manager of the Glasgow Corporation Transport Department, which has occurred in Glasgow at the age of seventy-six. Mr. Mackinnon, who retired in 1936, took a prominent part in the development of the Glasgow undertaking with which he was associated from the time when the tramways were transferred from private ownership to the Corporation in 1894. He was actually the first member of the tramways staff and became traffic manager in 1902, being appointed deputy general manager in 1910 and general manager in 1927.

Sir George Johnson.—The death is reported at his home in Bulawayo of Sir George Johnson, J.P., M.I.E.E., A.M.I.Mech.E., who was in his eightieth year. He was born at Terrington St. Clements, Norfolk, and educated at Bury St. Edmunds. In 1891 he went to South Africa to assist in the erection of the electricity station at Pretoria for Crompton & Co. Thereafter he held positions with Johannesburg firms until 1897 when he commenced business in Southern Rhodesia as partner with Mr. H. Clarkson Fletcher in Johnson & Fletcher, mechanical and electrical engineers and engineering contractors. Later a company was formed of which Sir George Johnson became chairman.

Maj. Gen. Sir Evan Gibb, K.B.E., C.B., C.M.G., D.S.O., who died on July 13th at the age of seventy, was associated with Sir Alexander Gibb & Partners, consulting engineers. He served as president of the London Chamber of Commerce from 1943 to 1946.

Col. W. Parker.—The death occurred on July 13th of Colonel William Parker, D.S.O., T.D., D.L., chairman of Electric & General Investment Co., Ltd.

Mr. S. L. Brunton.—The death is announced of Mr. Sydney Linton Brunton, M.Inst.C.E., A.M.I.E.E., which occurred at his home, Fort House, Hele, Taunton, at the age of eighty-four.

Col. H. M. Fordham.—The death is reported on July 19th of Col. Henry Marshall Fordham, M.C., O.B.E., A.M.I.E.E., late R.E.

Mr. W. C. W. Weaver, chairman and late managing director of Waygood-Otis, died suddenly on July 11th.

Wills.—Col. G. Davidson, D.S.O., of the Technical Lights & Equipment Co., left £6,443 (net personalty £5,919).

Mr. W. G. Stock, A.M.I.E.E., for forty-five years resident electrical engineer to the Mid-Southern Utility Co., at Hindhead, left £4,570 (net personalty £4,519).

Mr. G. E. W. Knowles, B.Sc., A.M.Inst.C.E., A.M.I.E.E., A.M.I.Mech.E., engineer and manager of the Settle & District Electricity Co., Ltd., left £2,159 (net personalty £1,475).

Mr. O. J. Wernet, retired electrical engineer, Newport, Mon., left £4,336 (net personalty £3,722).

Mr. A. J. Henning, A.M.I.E.E., commercial engineer to the Coventry City Electricity Department, left £2,927 (net personalty £2,718).

Mr. W. A. Kirkham, retired electrical engineer, Wylde Green, Warwickshire, left £4,424 (net personalty £3,004).

Mr. A. M. Mulliner, A.M.I.E.E., a former borough electrical engineer of Middleton, left £3,791 gross (net personalty £3,704).

Mr. Charles Gane, J.P., founder and late chairman of Seaton & District Electric Light Co., Ltd., left £22,203 gross (net personalty £22,106).

Dutch Power Output Recovers

IN a report of the Société Financière de Transports et d'Entreprises Industrielles (Sofina) reference is made to the position of the Dutch power industry. Up to 1943 the annual output remained at the 1939 level of about 2,500 million kWh, but from the beginning of 1943 to the end of the war military events resulted in a steep decline. From May, 1945, there was a gradual recovery and the aggregate production during 1946 is estimated at 2,665 million kWh despite the great difficulty experienced in obtaining supplies of coal.

Views on the News

Reflections on Current Topics

IN order to avoid the risk of unwise decisions on national policy, the public should be kept supplied with the kind of information given by Mr. P. Honey (of E.D.A.) recently to the Blackpool Rotarians. Discussing, among other things, the need to extract the utmost value in heat and by-products from fuel, he showed the fallacy of the suggestion that this could best be done by carbonizing all coal mined—an argument that has been used to justify proposals to link up the electricity supply and gas industries. These overlook the point that, even apart from the high electrical appliance efficiency, no process other than the generation of electricity has yet been found for utilizing the heat value of otherwise unsaleable coal.

* * *

Bearing on the above, I see that in the House of Commons last week a member advocated a policy of arbitrarily reducing the domestic electrical load and replacing it by "methods and appliances having a greater economy in fuel." This underlines the need for such a body as E.D.A. even more in the future than in the past, when the consumer's choice was the paramount consideration.

* * *

The figures given by the Minister of Supply for the production of electrical appliances during the seventeen months ended May 31st are indicative not only of the increasing popularity of electricity but also of the enormous demand for equipment which still remains to be met. Mr. Wilmot was not able to give the actual proportions of the goods which went for export, but manufacturers are being encouraged to send abroad as much as possible of the heavier current consuming apparatus such as fires and water heaters, while retaining here all but a token amount of the apparatus required in connection with the housing programme. Most of the quarter of a million electric cookers and rather more than that number of wash-boilers have presumably been kept in this country. As nearly all the new dwellings, temporary or permanent, have provision for immersion heaters not many of the half million will have gone overseas if the housing demands have been met. Probably the most disappointing figure is that for refrigerators, 31,167. This is not nearly enough for the "prefabs" alone and there is for this apparatus one of the greatest potential demands. Manufacturers cannot be blamed for the poor result: they have now generally re-equipped their works and are ready for large-scale production, but both sheet steel and motors are serious bottlenecks.

* * *

In Canada, which is one of the largest consumers of electricity per head of the population, it is naturally a valuable asset for a town to be able to claim that it offers the cheapest electricity. The Canadian Bureau of Statistics, in a survey carried out in Ontario, has discovered, however, that it is a complicated business comparing charges. According to the *Star Weekly* (Toronto) it finds—cautiously—that Sault Ste Marie seems to be the lowest in most brackets (rates of consumption) for domestic service, namely, four out of eight. It is also lowest in three out of nine power categories. In commercial lighting Orillia appears well in the lead in eleven out of twelve rates of consumption. Charges vary widely: in domestic rates, 300 kWh, including refrigerator and cooking, means a monthly bill of a mere $2·67 in Orillia, while at Swift Current (but not so cheap), Saskatchewan, the cost is $12·10.

* * *

Though I must admit that I have never been strong-willed enough to persevere in acquiring the special technique required in the use of the electric razor, I have always been under the impression that its principal advantage was that it could be used dry and there was accordingly no need to waste time and energy getting hot water and daubing one's face with lather. But apparently I was wrong. One of the latest American machines is intended for use wet in the normal way and, it seems, has been specially designed to permit lathering, which is now regarded as something to look forward to. "The vibrating blade whips through the toughest beard as if it were nothing," the advertisement says, and "men are crazy about the way it glides through whiskers with 7,200 slick clean strokes per minute."

—REFLECTOR.

Staffing and Management—II

Some Views on Future Policy

By G. O. McLean, M.Eng.

GENERAL methods of selecting staff and assessing the suitability of candidates were outlined in my first article (*Electrical Review*, July 11th, page 53).

The staff of the electrical industry are anxious to know what will happen to them under nationalization. Naturally, the thoughts of most of them, from top management down to apprentices or office boys, are individualistic, and the questions they are asking themselves are probably "What will *my* position be next year?" or "Will my present prospects of being a 'boss' in 5, 10 or 15 years disappear?" At present nobody can answer those questions, and this article does not make an attempt, but it is not too early for serious thought to be given to the question of personnel policy for the integrated supply industry. One way of stimulating such thought and for those in the industry to have some say in the framing of policy, is for someone to put down his thoughts on paper and for others to criticize or suggest amendments.

The correctness of personnel policy must have a profound influence on the efficiency of the whole industry through the individual's reactions to his treatment. The touchstone for all actions of the personnel department should be the effect such action will have on the human relationships of the men concerned. In other words, staff management should be planned to relieve the everyday stresses and strains of co-operative work in a public service rather than merely to avoid major conflicts by treating employees in the mass and individuals as numbers instead of human beings. Each employee must be treated as an individual human being, however much integration of geographical areas and functional responsibility is planned.

This personal touch can only be achieved if each Area Board is given full responsibility for staff control and movements, and if these responsibilities are similarly delegated from the Area headquarters to the districts into which the area must necessarily be divided. This does not mean that the Central Authority, and particularly its chief executive officers, will not have some form of control over the staff in the areas. These officials should be responsible for the most important function of co-ordination of all the services. It is they who must ultimately be responsible for ensuring that there is the minimum number of square pegs in round holes.

If this is not done, there is the danger that because the Central Authority will control all generation, a barrier may grow up between generation and distribution staffs. As many will readily agree, it has been difficult in the past to change from one branch of the industry to the other, but if the staffs of the Central Authority and the Area Boards were kept in separate compartments, there would be less chance than ever of a good generation man obtaining a suitable position on distribution work in an area. It is suggested, therefore, that the establishment office of the Central Authority should be responsible for all recruiting of technical staff (this to include accountancy, commercial and administrative sections), the training of such staff, and a comprehensive record system (with a special section to deal with transfers), and all negotiations with trade unions and Government Departments.

It would be useful to consider each of these functions in turn. The sources of supply from which industry can and does recruit its personnel have already been mentioned, namely, official bureaux, universities and technical colleges, advertisement, private recommendation, and unsolicited application, but since the field being considered covers the whole industry and all senior positions should be filled from within the industry, the principal source will be the universities and colleges, and the recruitment will be mainly at the bottom end of the staff ladder to replace retirements at the top end.

In other words, the number of trainees entering the industry should be roughly the same as the number of managers or chief executives retiring in each year. It is probable that many of the public advertisements will be replaced by the circulation of private lists to divisional offices or even direct to staff members who have registered their desire for a change with the transfer section of the central establishment office. This is not meant to imply that careful job

analysis and selection procedure will be unnecessary, because it is felt that these important functions must be carefully and successfully carried out for all movements of staff, even if they are internal adjustments.

Each Area Board should have experienced personnel officers responsible for interviewing and selecting, with the help of specialist assessors. A plea is here made for the avoidance of large selection or appointments committees. Interviewing technique should be similar to that outlined in the earlier article, in which a seven-point assessment was described. To enable the area personnel officers to have as wide a field of choice as possible and not be confined to their own areas, the Central Authority should do all the recruiting of junior technical staff from the universities and colleges, and also supervise their training both on distribution and on generation. Detailed consideration of the training to be given to juniors would take far too much space, but it is felt that for two years there should be covered as wide a field as possible, with specialization left until the end of this period.

Adequate Up-to-date Records

As already outlined above, the adequacy and up-to-dateness of records affect the efficiency of personnel departments to a great degree, and their importance increases with the number of staff controlled. It is imperative, therefore, that the Area Boards and the Central Authority should be well equipped with visible card systems from which can be found details of the career of each member of the staff. The central record need not be an exact duplicate of the Area Board's records, but be confined to staff above a certain level in status or remuneration in dealing with Area Board staffs, and, in addition, details of all their own directly-employed staff. Naturally the cards will be filed according to location or district, but, as is the practice in most large organizations to-day, there will be several indices, such as alphabetical and functional, to facilitate quick reference.

A further record which is recommended for attachment to the quick reference card is an annual rating slip. A simple three-point scale, which can easily be expanded into a five-point scale by additional markings in the columns on either side of the average, is recommended because of its simplicity. A sample of this is shown above, and it will be noticed the assessment is made under four main headings and one miscellaneous group. This rating card should be filled in by the individual's immediate superior who has intimate day-to-day contact with him. An explanatory note should be sent to the senior staff responsible for making the assessments, while the final total rating should be completed in the establishment office by those with intimate knowledge of the assessors themselves, so that due allowance can be made for inherent leniency or severity in rating assessments.

Staff Rating Card

Name	Position	Area ..... Division	
	Good	Average	Poor
Competence			
Acceptability			
Initiative			
Loyalty			
Other Traits—Good			
Other Traits—Bad			
Initials & Date:	TOTAL RATING:		

This annual rating is a question of personal opinion on various abstract traits and is therefore frowned on by some, but its advantages outweigh the disadvantages. It should be easily detachable from the record card proper when the discussion is with the individual himself.

Transfer Section

Mention has been made above to a special transfer section. This should be one of the Central Authority's most valuable pieces of co-ordination work. Because the few hundred independent authorities will be

reduced to sixteen major bodies (and perhaps ten times that number of divisions) and the internal promotions and adjustments will cause a drastic reduction in the number of public advertisements of staff vacancies, these results of integration should not be allowed to impair the present flexibility of staff movements. Each employee should feel free to apply for a transfer (giving reasons for the desire) from one district to another—or from one class of work to another; and, in the author's opinion, the machinery for handling this should be located at the central headquarters and be exceedingly efficient.

In addition to the personal or individual records (but of less importance) the Central Authority should be responsible for the more statistical records, such as numbers employed in each grade and for each function, labour turnover for the industry as a whole and between areas.

Control of Labour Turnover

Mention has been made of 12 per cent being a moderate turnover figure. Justification for this for a single undertaking, as at present constituted, is based on the fact that if a twenty-year length of service is considered a good average for all employees (and stability of the undertaking depends on such loyalty, which, in turn, depends on satisfactory conditions of employment) the basic turnover figure is 5 per cent. That basic minimum can reasonably be doubled to allow for movements within the single industry concerned; then the author recommends a control limit 20 per cent higher, making a top limit of 12 per cent. Theoretically there should be no bottom limit, but any turnover figures below 5 per cent indicate that the average service is exceeding twenty years. For the integrated industry the top limit should be 6 or 7 per cent, and for the individual areas between 8 and 9 per cent.

It should be the responsibility of the central office to investigate large differences between Areas and a careful analysis made of the causes of the differences. All the statistical records will, of course, be necessary for the Central Authority to carry out negotiations with trade unions.

As already hinted, it is felt that the negotiations and contact with the trade unions should be a function of the Central Authority, and this will be bound to affect the working of the present Whitley Councils. Both the size and the scope of the District Councils will be altered, but it does not follow that because the Central Authority negotiates on a national scale the District Councils should therefore be abolished. Past experience has shown that they act as a form of lubricating oil, and it is probable that more of this commodity will be necessary because of the increase in size of the machinery. Continued co-ordination is the principal fundamental of sound administration.

Closely allied to this question of union negotiations and wage agreements, and therefore part of the responsibility of the Central Authority's establishment office, is the whole range of incentives, including the pensions policy, though the finance officers would have a big say in this as well, the initiation and award of scholarships, payment of examination and other educational fees, the arrangement of study tours for those staff members who would benefit thereby (here, again, there would be collaboration with Areas and functional heads).

Much of this staff management work would fail to bear fruit unless the Central Authority did not also assume responsibility for co-ordination of health, recreation, and cultural activities, such as the fostering of staff clubs covering the numerous leisure pursuits of the average Britisher, and the issue of staff magazines.

Area Boards' Records

So far most of the views put forward have concerned the Central Authority's establishment office, but it is felt that the Areas should carry out very similar functions and will, of course, need to keep the same type of records so as to feed the Central Authority. All the staff contacts will be of a more personal nature, and the success of the whole industry will depend on the satisfactory operation of the Area establishment offices.

Finally, success will depend on the sound choice of each individual establishment officer. He must earn and deserve the respect of all the staff throughout the Area. While this is dependent to a great extent on the character and personality of the man himself, it depends too on his accessibility to all the staff whatever the grade, and almost at any reasonable time. The successful staff manager should be one who is not afraid of his position or his people, who is dependable to be the same every time, straight as a die, and able to see crookedness in any form.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Public Address Amplifiers

FOR the first time in its history the MULLARD WIRELESS SERVICE CO., LTD., Century House, Shaftesbury Avenue, London, W.C.2, is manufacturing amplifiers for public address purposes. A separate Electro Acoustics Division has been formed to deal, for the time being, with the export market only and special attention will be given to Latin America.

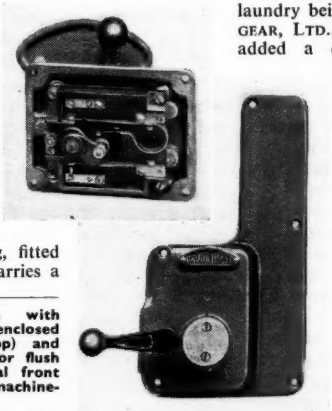
Among other articles newly designed for this purpose is the "Leader" class of amplifiers, including the 25-W "Achilles" and 50-W "Ajax," both rack-mounted and table models, while the rack-mounted 100-W "Exeter" will become available next year; there is also the ML. 101/00 model which can be operated from a 12-V battery or 50 c/s mains.

The first three models are all fitted with three input channels for radio, gramophone and microphone reproduction. Moving-coil and dynamic microphones with floor and table stands are also available.

Machine-tool Switch

A master switch for actuating contactors controlling the motors driving machine tools, which can be used for completing up to three different circuits and also act as a master stop switch, is offered by BROOKHIRST SWITCHGEAR, LTD., Northgate Works, Chester. The moulded bakelite case carries the terminals and all contacts, the latter being phosphor bronze leaf springs with silver tips.

A centre moulding, fitted to the switch shaft, carries a contact block connected to a fixed terminal by a flexible insulated connector. Simple positioning mechanism consists of star wheel and spring-loaded roller levers which provide two or three rest positions and a special feature is the provision of overtravel contacts in two positions, which permit the momentary closing of the control circuit, so initiating a "start" impulse. As the control handle is released the overtravel contacts are opened again, leaving only maintaining contacts closed. In this way the master control switch provides "no-volt" protection.



Two-position switch with shrouded handle for enclosed surface mounting (top) and three-position switch for flush mounting with special front plate to cover cavity in machine-tool

A shroud can be fitted over the handle to prevent accidental operation. The overtravel incorporated in the stop position can be used to energize a brake contactor for reverse current or d.c. injection braking.

Another arrangement of the same switch provides two start positions for forward-off-reverse, the off position being the centre position of the handle. A special feature of this arrangement is that depressing the handle towards the faceplate closes an extra circuit to give "inch" control. This movement may also be used for initiating other functions like braking, depression of the handle being only possible in the centre position.

The switch can be fitted to a number of standard faceplates for either flush cavity mounting or for enclosed surface mounting. The capacity at 440 V is 5 A (making) a.c. and 100 W (breaking, inductive) d.c, or 0·6 A continuously.

Heated Washing Machine

To the range of wash-boilers for home laundry being made by SOUTH WALES SWITCHGEAR, LTD., Blackwood, Mon., there has been added a clothes washing machine. It is manually operated, but electrically heated by 3-kW elements under three-heat control by two switches recessed into the left side of the body, which is rectangular and stove enamelled. The top casting is made of polished aluminium; fitting into it is a circular lid of pressed aluminium through which passes a stainless steel spindle with a die-cast aluminium paddle at its lower end and a crank at the top end for agitation by hand.

The manual wringer is clamped to the top casting by one knurled screw, so being removable for storage in a recess at the base, which is closed by a front door. When not in use, the cabinet is covered by an enamelled table top and a draw-off tap is fitted in front for emptying the water.

At a later date a paddle unit will be available for either the square or round wash-boilers made by this company and there will also be an enamelled table top for the round boiler, extras which will fit any of the clothes boilers already supplied.

COMMERCE and INDUSTRY

Coal Consumers' Councils.

THE Minister of Fuel and Power has now appointed the chairmen and members of the two Consumers' Councils set up under the Coal Industry Nationalization Act. The chairman of the Domestic Coal Consumers' Council is Dame Vera Laughton Mathews, D.B.E., former Chief Superintendent of the W.R.N.S., and the chairman of the Industrial Coal Consumers' Council, is Sir Ernest W. Smith, C.B.E., D.Sc., a noted fuel technologist and a former president of the Institute of Fuel. The term of office of all members in the first instance is three years. The secretary of both Councils is Mr. H. L. de Bourcier, M.B.E., Ministry of Fuel and Power. Among the members of the Industrial Consumers' Council is Miss R. Hands, B.A., a member of the Electrical Association for Women, who has been appointed to the Domestic Consumers' Council.

Traders to Visit Germany

The Board of Trade has been informed that as the result of improved facilities in Germany it will be possible for an increased number of business men to visit the joint U.K./U.S. Zones of Germany to buy goods and services. In future all applications to visit the U.K./U.S. Zones of Germany should be sent to the German Division, Board of Trade, I.C. House, Millbank, London, S.W.1, giving full details of the proposed transaction and itinerary. Firms are reminded that trading with Germany is subject to the normal import licensing and exchange control regulations. Business men who wish to sign contracts in Germany are therefore advised to make sure before departure that the necessary import licences will be forthcoming.

Accommodation for Electricity Boards

Among the matters which the Organizing Committee for the Electricity Supply Industry has under consideration is the accommodation which will be required by the Electricity Boards for headquarters technical, administrative and accounting staff. In this connection the Electricity Commissioners have circularized authorized electricity undertakers asking them to supply information as to the present accommodation held and occupied by them for this purpose.

A.S.E.E. Inventions Competition

The Association of Supervising Electrical Engineers announces the inauguration of "The A.S.E.E. Inventions Competition—Thurston Award," under which a cash prize of £10 given by Dr. A. P. Thurston, M.B.E., the Association's adviser on patents, will be awarded annually for the invention judged to be the most valuable contribution to the advancement of (a) utilization of electricity, (b) the improvement of distribution technique or (c) installation technique. The competition will be confined to members of the Association and entries must reach the general secretary, A.S.E.E., 54, Station Road, New Barnet, Herts., by December 31st, together with an entrance fee of 10s. 6d.

Electrical Exports in June.

Overseas Electrical Trade

Exports of electrical goods and apparatus show another increase in June, when the total was £3,765,733, as compared with £2,668,533 in June, 1946, and £1,134,284 for the 1938 monthly average. Satisfactory results are also recorded in the machinery section, the figures being generators, £679,744 (£174,650 and £157,150), electric motors and parts £304,896 (£187,770 and £145,045) and other electrical machinery £678,909 (£422,698 and £355,663). Imports of electrical goods and apparatus amounted to £182,722, as compared with £452,488 in June, 1946, and £263,002 for the 1938 monthly average. Fuller details will be given next week.

Heat-Treatment Plant for Turkey

Wild-Barfield Electric Furnaces, Ltd., have received an order for the supply of heat-treatment equipment to the aero engine factory of the Turk Hava Kurumu, Ankara, which is to manufacture the De Havilland Gipsy engines. The plant consists of modern electric furnaces of the "Heavy-Hairpin" type for general heat-treatment. Vertical forced air circulation furnaces with the patented charge progress recorder are to be used for the tempering of steel parts and the heat-treatment of light alloys. Low-temperature electric ovens are being supplied for paint drying and other applications. For the heat-treatment of high-speed steel tools and dies, etc., the electrode salt bath process will be used. A large amount of ancillary equipment such as carburizing boxes, loading tables, quench tanks, etc., is also being supplied.

British Switchgear for Aswan Dam

A. Reyrolle & Co., Ltd., has been awarded a contract for the supply of switchgear to the value of £732,110 (Egyptian) for the Egyptian Aswan Dam power station. A *Reuter* message from Cairo states that the total value of the contracts awarded amounts to over £E4,800,000, the remainder going to Swedish and Swiss firms. The power station's turbines are to be supplied by the Swedish K.M.W. Co. to a value of £E1,204,636 and by the Swiss Escher Wyss and Charmilles companies under two contracts amounting jointly to £E687,910. Dynamos valued at £E464,226 are to be provided by the

Swedish Asea Co. and others valued at £E1,404,933 by the Swiss Brown Boveri and Oerlikon companies. The Swedish Asea Co. has been awarded a contract for the supply of a £E321,240 transformer. A total credit of £E10,000,000 to finance the carrying out of the Aswan Dam hydro-electric scheme has been voted by the Egyptian Senate.

U.S. Electrical Machinery Exports

United States exports of electrical machinery during the first quarter of 1947 were valued at $127,672,000 compared with $61,222,000 in the corresponding period of 1946 and a three-month average for 1936-38 of $25,506,000.

Eire's Electrical Imports

The accompanying table, compiled from the official returns, shows the value of imports of electrical machinery and allied material into Eire during the first three months of the current year as compared with the corresponding quarter of 1946. It will be seen that this year's total amounts to £529,682, or an advance of £99,269 over the similar period a year ago.

CLASS OF EQUIPMENT	January-March 1946	1947
	£	£
Electric motors	15,453	20,395
Electric measuring instruments and apparatus	17,039	10,807
Other electric machinery	62,326	95,307
Vacuum cleaners	6,002	26,431
Accumulators and parts	8,104	7,843
Dry batteries and parts	1,987	5,735
Electric lamp bulbs	17,513	12,504
Electric fires, kettles, irons, etc.	13,476	24,224
Electric lighting fittings and parts	20,603	56,863
Electric wires and cables, insulated	78,776	59,294
Electric cooking apparatus and parts	15,630	25,945
Telegraph and telephone apparatus	22,849	27,773
Wireless telegraphy apparatus and parts	74,308	65,228
Other electrical goods and apparatus	76,347	91,333
TOTAL	£430,413	£529,682

Fatal Shock from Kettle Lead

A verdict of "Accidental death" was recorded by the Stafford district coroner at an inquest on Mrs. Constance Viola Strachan (48), of Cannock, who was found dead in her kitchen. Lying across her was an electric lead, one end of which was fitted to a plug, which was switched on, and at the other end was a connector for a kettle. Mr. H. B. Croft, deputy chief engineer of the Cannock Electricity Department, said the lead had at some time been repaired by an amateur, who had left the two rubber-covered wires rubbing against a flexible protecting spring at the end of the connector. The rubber on the red lead had become chafed, and the spring was alive from contact with the bare wire. Asked by the coroner if he could suggest any ways of preventing such accidents, Mr. Croft advised the public not to buy poor quality flex, and to take equipment to properly trained people for repair. He added that the fatality was the second which had occurred in Cannock's supply area in 25 years.

Flameproof Apparatus

The customary quarterly list of electrical apparatus, mining and industrial, for which certificates of flameproof enclosure were granted during the three months ended June, 1947, is now available. A few copies can be purchased for 1s. 2½d. each, post free, from the Library, Ministry of Fuel and Power, King's Buildings, Dean Stanley Street, Westminster, London, S.W.1.

Indian Import Control

A Government of India notice states that no licences will be granted for electric lighting bulbs, house service type; electrical copper and other wires and cables insulated or not (armoured cable, bare copper wire and bare hard drawn); electric fans, table and ceiling, and parts; and dry cells for torch batteries.

Sales Conference

A conference of the sales staff of Bull Motors (E. R. & F. Turner, Ltd.), was held in Ipswich on July 15th for the first time since 1939. At a dinner in connection with the conference, held at Felixstowe and attended by the directors and senior staff, Mr. A. Leggett, M.B.E., chairman and managing director, presided, and Mr. G. B. Wilkinson, secretary of the Associated Dynamo & Motor Manufacturers, was the guest. Mr. R. H. Dawson, who has represented Bull Motors in Manchester since 1925, proposed the chairman's health and made reference to the fact that Mr. Leggett has now been associated with E. R. & F. Turner, Ltd., for over fifty-five years.

Mechanical Handling Exhibition

In our issue of June 20th details were given of preliminary arrangements for the Mechanical Handling Exhibition organized by *Mechanical Handling* which is to be held at Olympia. It should be made clear that this exhibition is to take place in July next year, not this year.

Network Calculations

One of the newest of the mathematical approaches now available to the engineer for the predetermination of performance of machines and structures is that known as tensor analysis. Johnson & Phillips, Ltd., have issued a brochure (TF14) entitled "The Direct Setting-up of a $Z^{\alpha\beta}$ for Closed-Mesh Networks from the Network Diagram," which shows the application of tensor methods to the study of static network impedances considered from a specified reference frame. A companion

brochure (TF15) will be issued later in the year on "The Direct Setting-up of $Y^{\alpha\beta}$ for Junction Networks." A small supply is still available of Publication TF13, "The Impedances of Multiple-Winding Transformers," in which tensor methods are employed in the study of the self and mutual impedances of transformers. The brochures are reprints of articles by the company's technical adviser, Mr. S. Austen Stigant, which appeared originally in the *Beama Journal*. Applications for copies (free) should be made to the company at Victoria Way, Charlton, London, S.E.7.

Edinburgh Transformer Contracts

During a discussion at a recent meeting of the Edinburgh Corporation Public Utilities Committee regarding tenders received for the supply of auxiliary transformers required for Portobello power station, the suggestion was made that a "ring" was in operation as four of the five tenders received were similar, the fifth, from a Yorkshire firm, being 17 per cent below the other figures. Amounts for the new equipment were approximately £17,000 and £14,000. Treasurer Miller said he could hardly understand why they had such a discussion. They had gone into the open and advertised. The firm which submitted the lowest tender was a good reputable one and had the confidence of the engineer. After discussion, the Committee unanimously agreed to accept the tender of the Yorkshire firm at the lower figure. It was agreed that the whole matter be gone into by a sub-committee.

New Showrooms for Hammersmith

Subject to the consent of the Electricity Commissioners, Hammersmith Electricity Department is to provide electricity showrooms adjoining the Regal Cinema, Nigel Playfair Avenue, at a cost of £8,050.

Lichfield's "Coming of Age"

The Lichfield electricity undertaking celebrated on July 14th its "coming of age" when a luncheon was held at the Guildhall. In proposing the toast of "Lichfield's Electricity Undertaking," Ald. J. C. Tibbits, chairman of the Walsall Electricity Committee, congratulated the city upon the progress made during the past twenty-one years. Councillor A. L. Garratt, chairman of the Lichfield Electricity Committee, in reply, referred to the nationalization of the industry and said that an abundant supply of electricity at low prices was a fundamental condition for an area's successful growth, and whoever their successors might be, they had at least bequeathed them an efficient undertaking. In presenting Mr. W. F. Russell, the city electricity engineer and manager, with a television set as a mark of the City Council's appreciation, Councillor Garratt mentioned that Mr. Russell had been responsible for the development of the undertaking from its earliest days. Mr. Russell, in expressing thanks, said that whatever the outcome of nationalization, they must all put their backs into it, and make the new scheme a success for the benefit of all, because so much depended upon an efficient, cheap and abundant supply of electricity.

Shareholders Visit Strowger Works

Believing that shareholders are not in sufficient touch with the companies they own, the Automatic Telephone & Electric Co., Ltd., invited its shareholders on July 16th to hold their 27th annual meeting at the Strowger Works, Liverpool, to inspect the works and to have buffet luncheon and tea in a marquee erected for the purpose on the sports ground. Sir Alexander Roger (chairman) said that stockholders must take a more detailed interest in the companies in which their capital was invested, and no longer depend on chairmen's speeches alone in order to form their views on industry, its conduct and its future.

Danger of Amateur Repairs

At an inquest at Menston on Mrs. Marjorie Riley, who was found dead at her home, Mr. H. Lloyd, of the Yorkshire Electric Power Co., said a fire plug had been incorrectly wired. It was a two-pin plug and one of the connections had been made by twisting together one of the three strands in the flex with the earth strand. Mr. S. Riley, the husband, said he connected the plug to the fire six months ago, and a representative of the power company said the accident proved how undesirable it was for those who knew nothing about electricity to deal with electrical apparatus or wiring. A verdict of "Death from electric shock" was recorded.

"Amateurish and highly dangerous" was the description applied to the wiring of an electric plug, the defects of which led to the death of Thomas Bennett (23), of Stalybridge, a partner in the firm of Bennett Brothers, motor body repairers, Ashton-under-Lyne. Bennett was polishing a car with a buffing machine connected to the plug, when he received the fatal shock. An official of Ashton Corporation Electricity Department said the wiring of the plug would have been condemned if it had been inspected by any of the Department's officials.

Annual Holidays

The Mitcham works of the Philips Group will be closed for the annual holidays from July 28th to August 5th. The holidays of the Blackburn works, the Radio Transmission Equipment section at Balham and Philips Industrial, Brixton, commenced on July 19th and will end to-morrow (Saturday). The Hamilton works, Lanarkshire, which closed for the holidays on July 19th, re-opens on July 30th. The Service Department and stores at Waddon, Surrey, will not close.

The summer holiday break operates throughout the Mullard organization during the follow-

ing periods:—Mullard Radio Valve Co., Mitcham, Surrey, and Gillingham, Kent, July 28th to August 5th; and Electronic Transmission Equipment, Wandsworth, July 19th to July 26th.

Stamford Electrical, Ltd., is closing its works and offices from August 1st to 11th.

Clayton, Lewis & Miller, Ltd., announce that their factory will be closed for the summer holiday from to-day (Friday) to August 5th.

The works of the Sterling Engineering Co., Ltd., will be closed for the annual holidays from July 25th to August 6th.

Trade Publications

Brookhirst Switchgear, Ltd., Northgate Works, Chester.—Priced catalogue (No. 27, short delivery standards) of complete range of batch-produced motor controllers, hand operated and automatic starters, accessory push-button and limit switches, etc., with layout diagrams and over 70 photographic illustrations.

Young & Wildsmith, Ltd., 35, Little Russell Street, New Oxford Street, London, W.C.1.—Priced catalogue (No. 12, temporary) of wiring accessories and domestic appliances.

Hertfordshire Show

PRACTICALLY every service which electricity can render on the farm and in the home was represented in a comprehensive display arranged by the Northmet Power Co. at the Hertfordshire Show at North Mymms Park yesterday. Serving over a thousand farms and horticultural premises, the company has had a very wide experience in meeting many of the less usual electrical requirements of farmers and consequently there was an exceptionally large number of the not-so-well-known appliances. In the extensive horticultural section, for instance, in addition to greenhouse heating apparatus, soil warming and sterilizing equipment, propagating frames, forced draught equipment, circulating pumps and valves there were a hedge trimmer, flower pot washing and sterilizing machine and a glasshouse water heater.

Among barn machinery the "Essex" mill and the "Economil" figured prominently, together with mixers, grain conveyor, two-way hoist, sack lifter, seed conditioner and electric chain block. Incubators and brooders, brooder conversion units, egg tester and candling lamp and egg grader were of particular interest to the poultry farmer, while dairy equipment included a milking machine, cooler and cold room, sterilizers, churn stool, bottle washer, electrode steam raiser, storage water heater, bottle filling and discing machine and an electric milk pram. Pumps of all types, grinders, heavy-duty drills, welding plant, battery chargers, electric vulcanizers, a portable electric forge and a meter for measuring the moisture content of grain completed the farming display.

On the domestic side was a selection of the latest types of cookers, water heaters, wash-boilers, washing machines, refrigerators and vacuum cleaners, together with some of the smaller appliances such as clocks, irons and fires. Particular interest was taken in a water heating conversion unit.

Revised Specifications

THE revised version of B.S.889 on flameproof lighting fittings, bulkhead and well types, includes an appendix which prescribes the dimensions of six sizes of well glasses that are recommended to effect manufacturing economies. The third edition of B.S.279 relating to flameproof mining plugs and sockets of 100-A size provides for alternative diameters of glands to accommodate larger cables. This specification is not intended to secure identity of component parts, so the use of "contact tubes" of non-cylindrical form is permitted, if compatible with interchangeability.

The second revision of B.S.98 for caps and holders for Edison-type screw lamps details the dimensions and tolerances for five sizes of caps, sockets and gauges; particulars are included of central contact area, types of terminals, clearances, limiting voltages and wattages. The alternative medium cap (size E.27/33 × 30) is no longer recognized as a standard type, but a "lilliput" size has been included for the first time. The illustrations and dimensions of the entire range have been brought into line with those agreed upon internationally and the end of the threaded position of the cap is defined more precisely than hitherto.

Copies are obtainable from the British Standards Institution, 24, Victoria Street, London, S.W.1.

Trade Marks

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from July 16th.

TRONIX (design). No. 642,201, Class 9. Electrical instruments and apparatus included in Class 9, and insulated electric wire.—Flowerdale, Ltd., 16, Ogle Street, London, W.1.

ACOS (design). No. 647,215, Class 9. Wireless, television, telegraphic and telephonic apparatus and instruments; sound reproducing, recording, amplifying and locating apparatus and instruments; indicating apparatus; instruments for inspectional control; measuring apparatus and instruments, etc.—Cosmocord, Ltd., 700, Great Cambridge Road, Enfield.

WELEC. No. 647,332, Class 9. Electric flat irons and radio apparatus. Also No. 647,333, Class 11. Electrical cooking and heating apparatus, electric light fittings, and refrigerators.—Frank Westerman (Wholesale), Ltd., 94, Dale End, Birmingham, 4.

Public Works Exhibition

Street Lighting the Main Centre of Attraction

FROM the electrical point of view, at the Public Works, Roads and Transport Exhibition and Congress which the Prime Minister opened at Olympia, London, on Monday, attention is centred very largely on lighting, particularly street lighting. Even here, however, there are no sensational developments, though it is apparent that the use of fluorescent tubes for street lighting is beginning to " catch on," both the B.T.H. and the G.E.C. having attractive new lanterns to show. Apart from a wide range of lanterns, other B.T.H. items of more than usual interest are a flame-proof fitting, a blended light fitting for use with both a tungsten lamp and an electric discharge lamp, flood lights for yard and dock lighting, and a new acid-proof fluorescent lamp fitting entirely of plastic, except for rubber end covers.

A new version of the G.E.C. difractor lantern is a bronze aluminium die-cast model for use with 300- or 500-W tungsten or electric discharge lamps. The top castings, giving either side or top mounting, are interchangeable and can be supplied with a levelling device. A positive method of focusing is incorporated together with a new method of securing the dome refractor when a filament lamp is used. A faceted directional unit, also a light-alloy die-casting, for side-street lighting has been specially designed to reduce installation and maintenance costs. Anti-dazzle headlight bulbs and fluorescent tubular lamps operating at 110 V, 400 cycles, for use on automobiles are among a representative display of lamps.

Commercial Fluoresent Fittings

Street lanterns shown by Siemens include representatives of all types and there are also two neat examples of commercial and industrial fittings for use with fluorescent lamps. An inspection pit fluorescent lighting unit, insulated house-service fuse boxes and combined house-service units are other Siemens exhibits. A portable fluorescent lighting fitting taking three 80-W tubes and specially useful for emergency night road repair work, etc., is introduced by Scemco, Ltd., who, besides specializing in industrial fluorescent fittings, have also recently brought out the " Bi-Uni " push-button flush-fitting domestic switch.

How attractive lamp standards can be, is demonstrated by Concrete Utilities with the aid of scale models. A fascinating working model is also used by the G.E.C. to show the application of ripple control to street lighting, shop-window lighting and water heating. An illuminated map similarly demonstrates the " Rythmatic " control system for the Automatic Telephone & Electric Co., whose display also covers remote supervisory control, indication and metering, street fire alarms, private automatic telephones and traffic signals. In connection with the last-mentioned there is a large pictorial diagram indicating the various phases of traffic movement at the complicated Bank intersection (see next page). Demonstrations of the " Autoflex " traffic signals by the Siemens & General Electric Railway Signal Co. emphasize the ingenious unidirectional feature which ensures that only vehicles going towards the junction record their presence. The latest illuminated traffic signs can be seen on the stands of Franco Traffic Signs, I.R.S. and Gowshall.

Road and Building Research

Ingenious electrical devices employed in road and building research by the Department of Scientific and Industrial Research serve to point out the not-yet-well-enough-known facilities that are available to road engineers and others. Road engineers are showing considerable interest in the stone breaker, granulator and vibrating screen on the stand of H. R. Marsden, and in the electrically heated tarmacadam mixer demonstrated by J. Dawson Fawcett (Darlington).

The latest applications of electricity to water purification, pumping, etc., are to be found on the stands of Wallace & Tiernan, Bell Bros. (Manchester 1927), the Permutit Co., the Candy Filter Co., the Paterson Engineering Co. and Glenfield & Kennedy. Refuse disposal is another public service which is helped by electricity, in quite another way, namely, by the use of battery vehicles. Treece (Birmingham) have one of the Brush " Pony " trucks specially equipped for door-to-door collection.

Under-water electric welding and cutting demonstrations are attracting big crowds on the stand of Under Water Welders & Repairers, Ltd. Among other miscellaneous items of electrical interest are stokers (J. Brockhouse & Co.); a hoist (J. Christopher & Sons); the " Descaphone " intercommunication system (Fleming Electrical Corporation of Great Britain); a 22-kW Diesel engine driven alternator set (Newage); soldering irons (Rawlplug); floor scrubbers, squeegee, polisher, carpet shampooing and wax spraying machines (Rollnick & Gordon); and jointers' tents (Adam & Lane & Neave and John Smith & Co.).

The exhibition closes to-morrow (Saturday).

Street Lighting Trends

A historical survey of street lighting with an indication of probable future trends was presented to the Congress on Tuesday by Mr. N. Boydell, borough electrical engineer and manager of Eastbourne. Emphasizing that " poor lighting was worse than no lighting

at all," Mr. Boydell said that it had been estimated that 10 per cent of accidents would be avoided with efficient lighting, and since the average cost of an accident, as paid out in insurance claims without incidental costs, was about £130, a great deal of adequate lighting could be provided out of the money thus saved.

After tracing the progress of lighting through its various stages and describing the methods of control, Mr. Boydell compared the advantages of the present methods. From questionnaires issued to bus drivers and the police there appeared to be a very marked preference for the amber lighting of the sodium lamp and there was no doubt that its monochromatic illumination had a considerable effect on visual acuity. From the colour point of view, however, sodium was the most objectionable and was definitely a drawback in places such as shopping streets, city centres, parades, etc. Another drawback of sodium was that the general standard of brightness was low compared with that of other forms of lighting with the result that even car lights interfered with visibility. In his view for arterial road lighting it was undoubtedly the best form of light.

The future for tubular fluorescent lighting was very promising, especially for busy shopping centres, etc., where the strict economy of fittings and light output was not necessary and where the desire was to create a well-lighted appearance of the whole area including the fronts of buildings and pavements. In other circumstances it was unlikely that sodium and plain discharge lighting would be ousted by this new form of lighting.

Avoiding Glare

The avoidance of glare was always one of the major preoccupations of the street lighting engineer. Light-coloured surfaces were best but the universal use of these could not be foreseen and from the colour point of view the lighting engineer must not look for much assistance from the road engineer. Although the Ministry of Transport Report advised grading at the points of change from one standard to another, in Mr. Boydell's view the only drastic change in a well-lighted town would be from a Class A to a Class B road.

The probable trend of fittings, especially for filament and plain discharge lamps, would be to have composite units of lanterns and poles. In this way the daylight appearance would be enhanced and the future lantern would tend to be almost entirely of the side-entry type. Non cut-off fittings would probably be used almost exclusively on side roads. One improvement needed on through-traffic routes was the standardization of the quality of lighting. Within a decade or so most of the traffic routes should have lighting installations making vehicle headlights unnecessary, and it was possible to envisage that even side and tail lamps would be switched off on main roads in built-up areas.

City Traffic Control

System at the Bank

NEWLY planned coloured light signals have been provided to regulate the heavy street traffic at the complicated Bank junction of eight main streets, in addition to " lesser " junctions in the immediate vicinity, all controlled by the same master timer.

The specification was prepared by the Ministry of Transport and City of London Police. The control system was designed by the Automatic Telephone & Electric Co., Ltd., and inaugurated this week by the Lord Mayor of London, Sir Bracewell Smith.

This " Electro-matic " installation is vehicle actuated on the " flexible progressive " principle with a dual master timer for controlling not less than 35,000 vehicles each 12 hours, mostly through narrow approaches.

The lay-out is arranged to allow this volume of traffic to flow in four main stages, first east and west, followed by north and south bound vehicles, with a number of additional " minor " stages. The coloured light signals are actuated by a special control unit divided into seven sections, which are linked together to co-ordinate the signalling phases.

Right-of-way is given to an approach only if there is a demand and the length of the right-of-way period depends, up to a predetermined maximum, on the volume of the traffic. Right-of-way is offered to each approach in a definite sequence and according to a progressive plan by a master timer which sends pulses to maintain strictly the cycle of operations.

Special arrangements are made whereby in certain cases right-of-way time not used by one approach during any cycle may be used by a second approach.

The most recent development, known as " biased linking," has been applied to link the " Bank Complex " with several adjacent intersections to form one complete scheme.

Thus a special reservation is introduced into the timing which can best be described as a " right to priority " period during which particular through traffic is provided with a special " priority right " to the " green " signal and can thus temporarily over-ride the claims of cross-road vehicles which would otherwise cause delay.

Australian Power Production

THE Commonwealth Bureau of Census and Statistics has resumed the publication of statistics of the electric power industry, and has issued figures for 1944-45. In that year 6,474 million kWh was produced of which 3,653 million was generated by Government undertakings, 1,565 million by local authorities and 1,256 million by companies. The total installed capacity was 2,026,400 kW in 371 generating stations.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week the Minister of Supply (Mr. John Wilmot) said that the total production from January 1st, 1946, to May 31st, 1947, of the more important items of domestic electrical equipment and accessories was as follows:—

Cookers	243,338
Wash-boilers	281,178
Immersion heaters	523,742
Auxiliary water storage heaters	99,593
Fires	3,028,482
Refrigerators	32,167
Thermostats	898,393
Plugs	15,827,131
Ceiling roses	7,546,976
Lampholders	28,969,244
Switches	16,946,578
Sockets	9,179,247
Ceiling blocks	12,851,698
Conduit boxes	7,278,818
Meters	1,716,548
Switch fuses	8,669,959

There was no specific allocation for export. In the case of items such as fires, water heaters and immersion heaters, export was being encouraged to the maximum possible extent and manufacture for the home market curtailed, in view of the strain which these appliances imposed on the generating capacity of the country. In the case of items urgently needed at home for the housing programme (e.g., plugs, sockets, conduit boxes) export was, by agreement with the trade, limited to a token figure not exceeding 10 per cent of production. Distribution in the home market was made through normal trade channels.

Electricity from Tides

Mrs. Middleton asked the Minister of Fuel and Power whether he was yet in a position to report upon the inquiry into the practicability of schemes for the utilization of the tidal waters of the Severn for the production of electricity. Mr. Gaitskell said that the construction of, and experiments, with a tidal model which were an essential preliminary to further consideration of the project would take two years and no final conclusions could be reached in the meantime.

Turbine Generators

Mr. Gaitskell, Parliamentary Secretary to the Minister of Fuel and Power, said that eight new turbine generators were placed in commission in selected and non-selected power stations during the period June 30th, 1946, to June 30th, 1947. Mr. Gaitskell added that it took about three years to build a turbine generator, and therefore they were still catching up on the time lag during the war period. At present sufficient steel was allocated.

Mr. Hobson asked if the Minister was aware that eighteen months was the period before the war for the construction of a 30,000-kW turbo-generator, and that a power station was built in eighteen months on virgin ground during the war, and would he also look into the suggestion that plant construction was being held up because the allocation of steel was not being made by the Ministry of Supply. Mr. Gaitskell replied that this was a matter which could be more properly gone into during the coming debate.

Hydro-Electric Plant

Mr. Kirkwood asked the Secretary of State for Scotland whether, in view of the shortage of timber for housing and the urgent need for houses in Scotland, he would now arrange to cancel permits for the supply of timber to hydro-electric and similar schemes which had a priority higher than that granted for housing purposes. Mr. Westwood said he could not. It had been decided that we must for a time give precedence to projects which would increase our resources of fuel and power. The allocation of timber for essential hydro-electric purposes amounted to less than 2 per cent of housing needs.

Purchase Tax Changes

During the report stage of the Finance Bill Mr. Peake moved a new clause to get from the Chancellor of the Exchequer an explanation of the position of retail traders in the reduction of purchase tax on particular goods.

Mr. Dalton said that he would like to have found a way through the difficulty, but had not succeeded. The advice given to him was that no workable system of rebates could be devised which would be equally fair to the trader and to the Revenue. It was easy to exaggerate the grievance from which the retailers suffered. After all, what had happened was that, in some of the things they sold, the tax had been reduced or remitted. It was only on those things that it was to their disadvantage. Under the law, traders were quite free to pass on the tax which they had borne on their tax-paid stocks, even if they were subject to controls operated by the Board of Trade or any other Department. In the case of electric cookers, and so on, there was no question of refunding any public money, because the tax would never have been due, it having been remitted on those articles. The number of cookers on which the tax was collected at the higher rate was small.

The clause was negatived by 263 votes to 89.

On the third reading of the Finance Bill, Mr. Oliver Stanley said that the history of the taxation on electric cookers ought to be published as an object lesson in national planning. It had been a revelation. In April last year the Chancellor of the Exchequer took off

the tax because he wanted, in a modern world, to encourage the use of modern methods. A year later he had learnt his lesson, and had found out that an electric cooker was no good without electricity, so he said that, as they could not have electricity, anybody who bought an electric cooker was only buying it as an ornament or a luxury and therefore he would put back the tax. But in a few weeks hon. members had pointed out to him that in most houses now being built if you did not cook with electric cookers you could not cook at all; that the people, still having something left to cook, were determined to cook it; and that the only effect of the tax was to make them pay a bigger rent for their Council houses. So off came the tax again. It was, said Mr. Stanley, on the classic method of the Government's planning—order, counter-order, disorder.

Coal Stocks

In the course of a recent debate on coal supplies and prospects, Mr. Shinwell reviewed the stock position. He said that at the beginning of the coal year, that was, at the end of April, 1947, distributed coal stocks totalled 5,989,000 tons as compared with 6,846,000 tons at the corresponding date last year. But by July 5th this year we had raised stocks to 10,522,000 tons. At the corresponding date last year stocks were 8,603,000 tons.

It was interesting to note the present position of the main categories of users. Electricity stocks totalled 3,127,000 tons, representing nearly four and a half weeks' supply. At the corresponding date last year the figure was 1,476,000 tons. The target for the end of the summer was six weeks' supply, and there were already four and a half weeks' supply. Gas stocks totalled 2,108,000 tons, representing nearly four weeks' supply. At the corresponding date last year the figure was 1,300,000 tons. The target for the end of the summer was five and a half weeks' supply, though they might not do better than five weeks' supply. In engineering the present stock was 463,000 tons, representing four and a half weeks' supply. Last year's stock was 403,000 tons. They were not so well off as regarded distributed stock for iron and steel, but an additional 42,000 tons weekly had recently been allocated.

Captain Field urged the need for increased efficiency in our use of fuel. He said that one might have expected that the Ministry of Fuel and Power would have been strengthened technically and scientifically, using the experience of the war years of rapid technological development or the use of research and development contracts, especially of the method of operational research. The Parliamentary and Scientific Committee had estimated that a saving of 20 million tons of coal a year could be achieved. That should be regarded as a short-term target.

Turning to domestic appliances he said that the open coal grate was only 12 to 20 per cent efficient whereas modern gas or coke stoves or grates could achieve efficiency of up to 50 per cent. In the electrical industry the efficiency of generation was only about 21 per cent. There were dynamic reasons why this efficiency could not be increased. By the time that the domestic consumer received his electricity, its efficiency, owing to distribution losses, was probably nearer to 15 per cent than anything else. Therefore, they should reduce the domestic load on the electricity system and replace it by methods having a greater economy in fuel.

I.E.E. Premiums

Awards for Papers in 1946-47

THE Council of the Institution of Electrical Engineers has made the following award of premiums for papers read or accepted for publication during the session 1946-47:—

Group A.—*Institution Premium*, Dr. H. G. Booker; *Kelvin Premium*, Dr. H. A. H. Boot and Professor J. T. Randall; *John Hopkinson Premium*, Mr. H. A. Thomas.

Group B.—*Non-Section Premiums:* Messrs. J. R. Mortlock and C. M. Dobson (Ayrton Premium), Messrs. J. Hacking and J. D. Peattie (Llewellyn B. Atkinson Premium), and Mr. C. H. Sparks (Extra Premium); *Installations Section Premiums:* Messrs. V. J. Francis and W. R. Stevens (Crompton Premium), Messrs. F. Widnall and R. Newbound (Swan Premium), Messrs. C. F. Freeman and H. V. Mather (Extra Premium); *Measurements Section Premiums:* Mr. W. Casson and Dr. F. H. Last (Silvanus Thompson Premium), Dr. F. M. Bruce (Mather Premium), Dr. A. L. Whiteley (Extra Premium), Mr G. H. Farrington (Extra Premium), and Dr. A. M. H. Arnold (Extra Premium); *Radio Section Premiums:* Dr. D. C. Espley, Mr. E. C. Cherry, and Mr. M. M. Levy (Duddell Premium), Mr. C. Crampton (Extra Premium), Mr. W. Ross (Ambrose Fleming Premium), Dr. D. Gabor (Extra Premium), Messrs. J. Bell, M. R. Gavin, Dr. E. G. James, and Mr. G. W. Warren (Extra Premium), Mr. C. J. Banwell (Extra Premium), Dr. J. H. Fremlin, Messrs. A. W. Gent, D. P. R. Petrie, P. T. Wallis, and Dr. S. G. Tomlin (Extra Premium), and Messrs. D. Cooke, Z. Jelenek, A. J. Oxford, and E. Fitch (Extra Premium); *Transmission Section Premiums*, Mr. G. T. Garwood (Sebastian de Ferranti Premium), Mr. T. R. P. Harrison (John Snell Premium), and R. C. Cuffe (Extra Premium).

Group C.—*Fahie Premium* to Mr. E. P. G. Wright; *Paris Exhibition* (1881) *Premium* to Mr. W. Fordham Cooper; *Webber Premium* to Mr. W. E. C. Lamport; *Overseas Premium* (for senior members) to Mr. T. S. Skillman; *Students' Premiums* (value £10): Messrs. S. R. Phelps and C. A. B. Betts; *Students' Premiums* (value £5): Messrs. R. V. Darton, W. G. Stonor and R. W. L. Palk, D. L. Dickson, J. C. Goward, P. Newsum, P. K. Johnson, B. A. L. Ellings and K. W. Wardrop.

ELECTRICITY SUPPLY

Sites for New Stations. Sheffield Undertaking's Finances.

Barnes.—FURTHER REBATE.—The *Richmond Herald* reports that another rebate is to be given to Barnes electricity consumers for the September quarter. It is of 25 per cent on the unit charge to all consumers except those few paying through prepayment meters or by a fixed sum.

Bristol.—NEW POWER STATION.—A new power station is to be built in the Bristol area of similar size to the existing Portishead station on a site that has yet to be definitely decided. It is expected to be ready for operation in 1953. At Portishead extensions to the generating plant are in progress and are scheduled for completion next year.

Chester.—TRANSMISSION LINE OVER THE DEE.—The Electricity Department is to erect a 33-kV overhead transmission line across the Dee at Eccleston.

Cleethorpes.—LOAN.—The Town Council is applying for consent to a loan of £15,984 for various electrical works, including extensions and replacement of substations.

Dartford.—NEW SUBSTATION.—In connection with the Temple Hill estate development the borough electrical engineer has submitted an estimate of £18,280 for a new substation to replace the present kiosk.

Fulham.—LOAD SHEDDING PLANS.—The Borough Council has approved plans for shedding the electricity load if next winter is severe. The borough will be divided into five areas and cuts will be applied to a particular area on a certain day each week.

Hackney.—GENERATING STATION EXTENSIONS.—The Electricity Committee proposes that steps should be taken to enable the scheme for the extension of the Millfields Road generating station to proceed without delay should a direction be received.

Hammersmith.—MAINS EXTENSIONS.—Sanction has been received by the Electricity Committee to a loan of £18,550 for mains extensions.

Islington.—PLANT ESTIMATES.—The Electricity Department estimates that it will require during the next two years 200 air-cooled transformers costing £45,000, and five Scott-connected transformers costing £8,500. Expenditure on mains and services during the same period is estimated at £28,500.

Lowestoft.—RURAL EXTENSIONS.—The Corporation is to arrange for the supply of electricity to farms and private dwellings in the parishes of Flixton and Blundeston at an estimated cost of £1,365.

Ossett.—EXTENSION OF TIME.—The Electricity Commissioners have made the Ossett Electricity (Extension of Purchase Date) Order, 1947, extending to December 30th, 1951, the period after which the Corporation may require the re-transfer to itself of the undertaking authorized by the Ossett Electric Lighting Order, 1898.

Sheffield.—ANOTHER LOSS.—Attributed mainly to salary and wage increases, the fuel crisis and poor and costly coal the accounts of the Corporation electricity undertaking to March 31st last show a debit balance of £173,737 on the year's working, despite increased charges to users. This is the fourth successive year in which there has been a loss, the gross debit being £539,000.

Southampton.—SEEKING SITE FOR NEW STATION.—Speaking at a recent meeting, Alderman G. B. Bascomb, chairman of the Electricity Committee, said that the present generating station would become absolete in a few years. Before the Committee went out of existence, probably at the end of the year, they would like to take preliminary steps to secure a finer station to meet the demands of future years. At one time Fawley or Millbrook had been suggested as sites but a proposal had now been made that the rolling mills at Woolston might be considered, and that would be done.

Tipton.—STREET LIGHTING.—Application is being made for sanction to borrow £4,000 for lighting the roads on the Upper Church Lane housing estate by electricity.

Worthing.—SUPPLY TO HOUSING ESTATE.—It is proposed to provide an electricity supply to a new housing estate at Sompting at an estimated cost of £2,516.

TRANSPORT

Bradford.—TRACTION SUBSTATION.—Approval has been given to the Electricity Committee's proposal to provide a traction substation at Northcote Road, Undercliffe, at a cost of £12,623, for the conversion of the Undercliffe tramway section to trolley-buses.

Darlington.—TROLLEY-BUSES FOR SALE.—The Town Council, which recently decided to replace its trolley-bus system with motor-buses, is trying to to dispose of six trolley-buses which it ordered before the decision to replace the system was taken. It is hoped that it will be possible to exchange them with another authority for motor vehicles.

Hebburn-on-Tyne.—TRAFFIC LIGHTS.—The Urban District Council has applied for grants towards a £1,100 plan for automatic traffic lights at the junction of Black Road and Victoria Road East.

Sunderland.—TRAMWAY EXTENSION.—Work is to start as soon as possible on a half-mile extension of the tram track in Durham Road.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The General Electric Co., Ltd., reports that, after providing for E.P.T. and profits tax, the profit on trading and income from investments for the year ended March 31st last was £2,270,965, as compared with £2,300,554 for 1945-46. After deducting depreciation, fees, pensions £625,764 (£574,141) and income tax £740,000 (£770,000), there is a net profit of £905,201 (£956,413). General reserve receives £320,678 (nil), but no provision is made for repairs and rehabilitation (£350,000). It is proposed to pay a dividend of 10 per cent and a cash bonus of 7½ per cent, making 17½ per cent, less tax, for the year on the ordinary stock, both payments being the same as for the preceding year. A sum of £986,859 (£991,790) is carried forward. At March 31st the number of employees was 49,500 and there were still 3,170 serving in the Forces.

The directors state that a large volume of orders has again been received in all fields, but fuel cuts, general shortage of materials and dearth of labour are consistently retarding output. In spite of these difficulties export business shows a satisfactory improvement though delays in delivery are increased by inadequate shipping facilities. The overseas companies have shown good results. Consolidated accounts issued for the first time show profit on trading and other income amounting to £2,641,138. Income from investment brings the total to £2,785,569. After deducting depreciation £660,565, fees £3,000 and contribution to pension fund £155,642 there is a net credit balance of £1,966,362. Income tax takes £955,910 and there is a net profit of £1,005,441. The carry-forward is £910,785 (£1,582,432).

British Electric Resistance Co., Ltd.—Although the company traded at a profit during the year ended July 31st, 1946, it is not proposed to pay any dividend for the year ending July 31st, 1947. The chairman, Mr. H. Paul-Huhne, says that under the conditions that have existed and taking into account the dislocation caused by the shut-down in February, it seems as though the profit earned will be no more than sufficient to cover the loss occasioned by the closing down of the Northern Ireland venture. The trading profit is £7,801 (£25,775), plus profit from subsidiary £8,996 (£8,311), making £16,797 (£34,086). After providing for taxation the net profit is £8,320 (£8,809) the carry-forward being increased from £8,211 to £16,531.

Pye, Ltd., reports a net profit for the year ended March 31st last of £120,543, as compared with £120,077 for the preceding year. The premium on the share issue (less costs) £165,434 is transferred to general reserve. Staff pension fund receives £4,000 and income tax requires £65,000. The preferred dividend is maintained at 10 per cent, and the deferred dividend is unchanged at 25 per cent. The balance carried forward is £155,660 (£142,076).

The Mirrlees Watson Co., Ltd., reports a trading profit for the year to March 31st last of £33,449, as compared with £40,445 for the preceding year, plus interest, fees, etc., making £36,523. Taxation requires £18,000 and the ordinary dividend for the year is unchanged at 8 per cent. The balance carried forward is £4,056 (£9,160).

Crossley Bros., Ltd., report a net profit for 1946 of £49,902, as compared with £42,026 for the preceding year. The deferred ordinary dividend for the year is unchanged at 12½ per cent, and the new deferred ordinary receive 8½ per cent. The balance carried forward is £48,128 (against £45,447 brought in).

Crossley-Premier Engines, Ltd., reports a net profit to April 30th last of £20,169 (against £41,773). The ordinary dividend for the year is 12½ per cent (against 25 per cent), general reserve receives £6,500 and the balance carried forward is £23,481 (£22,942).

Greenwood & Batley, Ltd., report a profit for the year, including E.P.T. recoverable, of £86,226, as compared with £121,258 for the previous year. The final dividend is again 10 per cent, maintaining the distribution for the year at 15 per cent.

Richardsons Westgarth & Co., Ltd.—Lt. Col. H. M. Stobart (chairman), in a statement issued with the report and accounts, says that the company's order book now exceeds £12,000,000. Of that total £8,400,000 represents marine work, 60 per cent of which is for export.

Aron Electricity Meter, Ltd., in a preliminary statement, reports a trading profit for the year to March 31st last of £51,359, the net surplus being £18,822 compared with £12,563 for the previous year. A first and final dividend of 15 per cent (against 10 per cent) is recommended.

The Revo Electric Co., Ltd., proposes to pay a final dividend of 12½ per cent and a bonus of 10 per cent making, with the 5 per cent interim, 27½ per cent for the year (against 20 per cent.

The North of Scotland Hydro-Electric Board.—Of the 71 per cent of the issue of £5,000,000 stock applied for, all except £18,350 worth came from Scotland.

Christy Bros. & Co., Ltd., are again paying a dividend of 17½ per cent. The net profit, after taxation, was £38,987 (£23,599).

Veritys, Ltd., are to pay a dividend of 2½ per cent, as compared with 7½ per cent in the previous year. There was a loss of £7,640 as against a profit of £18,550, the carry-forward being reduced from £16,534 to £6,419.

The Globe Telegraph & Trust Co., Ltd., is paying a final dividend of 2 per cent tax free making 5 per cent tax free for the year.

Redfern's Rubber Works, Ltd., are maintaining their interim dividend at 5 per cent.

New Companies

Piggott & Whitfield, Ltd.—Registered July 2nd. Capital, £12,000. To acquire the business of electrical engineers carried on by C. W. Piggott and J. N. Whitfield at Cooper Street, Stockport. Directors: C. W. Piggott and J. N. Whitfield. Regd. office: 9, Cooper Street, Stockport.

"Victrolec" Ltd.—Registered June 28th. Capital, £1,000. Manufacturers and dealers in electrical, radio and domestic equipment, etc. Directors: A. E. Metcalf, J. H. Metcalf and Mrs. Gladys Metcalf. Regd. office: 261-63, Victoria Road, Aston, Birmingham.

Clarke (Electrical) Co., Ltd.—Registered June 30th. Capital, £1,000. J. C. Clarke is the first director. Regd. office: 29-31, Euston Road, N.W.1.

Haines & Sheppard, Ltd. — Registered June 30th. Capital, £2,000. Electrical engineers, etc. Directors: A. W. Haines and E. W. Lake. Regd. office: 22, Bullescroft Road, Edgware

Stonor Electrical Wholesalers, Ltd.—Registered July 8th. Capital, £200. Subscribers: H. Bach and R. W. Harris. Secretary: Rosalind Sawyer, Finsbury House, Blomfield Street, E.C.2.

Robert Kemp, Ltd.—Registered in Dublin June 17th. Capital, £5,000. Manufacturers and dealers in electrical batteries, fittings and all electrical accessories, etc. First directors: R. Kemp, 205, Pearse Street, Dublin, J. Greenaway and J. Kemp.

Murphy Electric Co., Ltd.—Registered in Dublin June 18th. Capital, £2,000. Subscribers: W. D. Murphy, 21, Thornhill Park, Belfast, and G. B. Rothwell.

Bulwell Electric and Radio, Ltd.—Registered July 4th. Capital, £6,000. Directors: G. S. Cooper and others to be appointed. Regd. office: 207, Main Street, Bulwell, Nottingham.

E. R. Steele, Ltd.—Registered July 3rd. Capital, £1,500. Electricians, etc. Directors: E. R. Steele, I. M. Steele and F. Butler. Regd. office: 1, Broadwater Street East, Worthing.

Southdown Electrics, Ltd.—Registered July 3rd. Capital, £5,000. Directors: C. H. R. Millington and W. R. Boxall. Regd. office: 10, Victoria Road South, Southsea.

Ward Brothers (Leyton), Ltd.—Registered July 3rd. Capital, £4,000. To acquire the businesses of radio and electrical engineer and contractor carried on by H. Ward at 731 and 797, High Road, Leytonstone, as Ward & Co. and Ward Brothers respectively. Directors: H. Ward and S. G. Ward. Regd. office: 797, High Road, Leytonstone, E.11.

Magnetic Devices, Ltd.—Registered June 26th. Capital, £5,000. Manufacturers and dealers in relays, solenoids, stepping switches and other electro-mechanical, magnetic, electric and electronic devices, etc. Secretary: Fred Keys, A.S.A.A. Regd. office: Ditton Works, Newmarket Road, Cambridge.

Solar Electric Co., Ltd.—Registered June 27th. Capital, £5,000. Manufacturers and dealers in electrical incandescent and fluorescent lamps, etc. V. A. D. Kent is the first director. Regd. office: 133-35, Oxford Street, W.1.

Vacuum Development & Manufacturing Co., Ltd.—Registered June 26th. Capital, £100. Manufacturers and dealers in incandescent, fluorescent and quartz lamps, discharge tubes and electronic devices, cookers, etc. Other particulars as for the Solar Electric Co., Ltd., above.

Warton-Mitchell, Ltd.—Registered June 23rd. Capital, £7,000. Electrical engineers and contractors, etc. Directors: G. M. Panting, and E. Warburton. Regd. office: 16-18, Russell Street, Manchester, 1.

Bowden Repairs, Ltd.—Registered July 8th. Capital, £10,000. Manufacturers, repairers and dealers in dynamos, motors, batteries, etc. Permanent directors: A. H. Bowden and J. H. Bowden (secretary). Regd. office: Sardinia House, Sardinia Street, W.C.2.

Liquidations

Attracta Electrical & Engineering Co., Ltd., 58-58a, Guilford Street, Russell Square, W.C.1. —The first meetings of the creditors and shareholders were held at the Board of Trade offices, Columbia House, Aldwych, London, W.C.2. No statement of affairs had been submitted, but the liabilities were approximately £12,000, and the assets were valued at £485. The matter was left in the hands of the Official Receiver.

G. A. Ryland's Electrical & Engineering Co., Ltd.—Members' voluntary winding-up. Particulars of claims by August 15th to the liquidator, Mr. R. Griffiths, Lloyds Bank Chambers, Brierley Hill, Staffs. This notice is purely formal as all creditors have been or will be paid in full.

Bankruptcies

A. V. Richardson, radio and electrical engineer, carrying on business at 126, Manningham Lane, Bradford, as Market Radio and Electrical Supplies.—First meeting July 24th at the Official Receiver's Office, Hallfield Chambers, 71, Manningham Lane, Bradford. Public examination September 2nd at the County Court, Manor Row, Bradford.

STOCKS AND SHARES

STOCK Exchange markets have fallen into a dull condition, the heaviness of British Government securities arousing uneasiness in the minds of investors, and leading to restraint on the part of capital to seek employment until the outlook becomes a little clearer. With the beginning of August, the transfer stamp duty is raised from 1 to 2 per cent, a factor which came into increasing prominence last week, causing buyers to accelerate their purchases in a manner which brought about temporary strength. New issues meet with support, though the opening prices do not always provide the profit anticipated by the stag brigade. The present transfer stamp duty of 1 per cent works out to practically 2½d. per share upon shares standing at 20s.

Bonus Element

Justification for the new 10 per cent impost on bonus issues remains entirely obscure, but amendments to the Finance Bill give a clearer indication of how it will apply in practice. For all practical purposes it now appears that the bonus element, which attracts the new duty, consists of the difference between the price at which a company offers new shares to stockholders, and the price at which they (or the letters of rights) are officially quoted on the first day of dealing. Taking, for example, a company offering new shares to stockholders at 40s. on the basis of one new for every three shares held, the latter being quoted at 60s., the " rights " work out at 5s. per share held. Other things being equal, the opening price of the new shares will be 55s. It is the difference, namely 15s., between this figure and the issue price on which the 10 per cent duty operates. A minor concession exempts small issues from the impost.

Gilt-Edged Depression

Conditions were anything but propitious for last week's issue at par of £5 millions North of Scotland Hydro-Electric Board 2½ per cent stock, redeemable in 1965/72 and guaranteed by the Government. It arrived in the gilt-edged market on the heels of the Southern Rhodesia 2½ per cent stock, dated 1965/70 and issued at 99; of this issue, 83 per cent was left with the underwriters, and the price fell to 2⅛ discount. With the gilt-edged market as a whole showing little disposition to throw off its persistent depression, the circumstances were against the success of the North of Scotland issue and it may therefore be considered satisfactory that 71 per cent of the issue was applied for.

The Month's Price Movements

Since a month ago, the majority of prices quoted in these columns show falls, although here and there substantial improvements have occurred. Cable & Wireless ordinary shows a fall of nearly 20 points,. Maintenance of the General Electric Company's dividend of 17½ per cent had little effect upon the price, which at 96s. 3d. is 3s. 3d. down on the month. De la Rue have fallen sharply. Aron Electricity Meter has raised its dividend from 10 per cent to 15 per cent. This makes the shares look cheap at 55s., the price ruling before the dividend appeared.

Equipment and Manufacturing

Although without noticeable effect on prices, the Ministry of Works' announcement of the Government's intention to spend £75 millions on building electric power stations impressed the electrical equipment market as an indication of the extent of the generating plant shortage. On the average, Stock Exchange quotations have lost ground. Comparison with those of a month ago gives mixed results. Good dividends and reports have been responsible for sharp rises in Chloride Electrical, Walsall Conduits and Ward & Goldstone. Midland Electric Manufacturing, A.E.I. and Ever Ready have also advanced. On the other hand, the lists show appreciable losses by Crompton Parkinsons, English Electric, Reyrolles and a number of others. Decca shares at 53s. 9d. are 5s. down.

W. T. Henley's Telegraph Works

At this company's annual meeting reported in last week's *Electrical Review*, Sir Montague Hughman referred to a matter of general interest to the market in electrical equipment shares when discussing the future position of manufacturers for the electric supply companies in the event of nationalization. Sir Montague pointed out that a single authority might become the buyer for the bulk of his company's home production. His hope that the cable makers will be allowed by the new authority to continue their work on present lines was supported by considerations of the interdependence of manufacturers for home and export markets. Despite shortages, the chairman was able to state that the progress made during 1946 was extending satisfactorily into the current year. About 36 per cent of last year's business was for export. The shares are firm at 27s.

Electric Construction Dividend

Electric Construction have declared a 12½ per cent dividend for the fifth successive year, and the shares remained steady at 70s. ex-dividend, notwithstanding the decline in the year's net profit, which, according to the preliminary figures, is £31,700 lower at £58,300. The profit of £90,000 for 1945-46 was struck after the deduction of £46,000 for E.P.T. and resulted, the chairman stated a year ago, largely from Government contracts. Labour and materials, particularly the latter, were said

(*Continued on page* 154)

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Est. Comp.*	Last Div.	Middle Month's Price July 18	Rise or Fall	Yield p.c.
Home Electricity Ordinary					£ s. d.
Bournemouth and Poole	66/8	12½	63/–	..	3 19 2
British Power and Light	37/10	8	35/6	..	4 10 0
City of London ..	34/4	7	32/6	..	4 6 2
Clyde Valley ..	46/5	8	43/6	..	3 13 6
County of London	49/5	10	46/6	..	4 6 0
Edmundsons ..	31/6	6	29/6	..	4 1 4
Elec.Dis.Yorkshire	51/–	9	48/–	..	3 15 0
Elec. Fin. and Securities ..	67/–	15	63/6	..	4 14 3
Elec. Supply Corporation ..	50/8	10	48/–	..	4 3 4
Lancs. Light and Power.. ..	37/7	7½	35/6	..	4 4 6
Llanelly Elec. ..	29/1	6	27/–	..	4 9 0
Lond.Assoc.Electric	29/6	6	28/–	..	4 5 9
London Electric .	31/4	6	29/6	..	4 1 4
Metropolitan E.S.	48/–	9	45/–	..	4 0 0
Midland Counties	51/5	8	48/6	..	3 6 0
Mid. Elec. Power	47/–	9	44/6	..	4 1 0
Newcastle Elec...	32/7	7	30/6	..	4 11 10
NorthEasternElec.	36/6	7	34/–	..	4 2 4
Northampton ..	50/11	10	48/3	–6d.	4 3 0
Northmet Power.	48/2	9	45/6	..	3 19 3
Scottish Power ..	46/1	9	43/6	–1/6	4 2 6
Southern Areas..	24/–	5½	23/–	..	4 15 7
South London ..	33/–	7	31/6	..	4 9 0
Yorkshire Elec...	50/10	9	48/–	..	3 15 0

Company	Dividend Previous	Dividend Last	Middle Month's Price July 18	Rise or Fall	Yield p.c.
Public Boards					
Central Electricity:					
1963–93 ..	3½	3½	109½	..	3 4 0
1974–94 ..	3½	3½	107½	..	3 0 6
LondonElec.Trans.	2½	2½	101	..	2 9 3
Lond.Pass.Trans.Bd.					
A	4½	4½	124½	–1	3 12 3
B	5	5	119½xd	–1	4 3 8
C	3	3	61½	–1	4 18 4
Overseas Electricity Companies					
Atlas Elec. ..	Nil	Nil	13/9	–6d.	—
Calcutta Elec. ..	6†	6†	45/–	–⅛	2 13 4
Cawnpore Elec...	13	13	61/3	–4/3	4 5 0
EastAfricanPower	7	7	47/6	–6d.	2 19 0
Jerusalem Elec...	5	6	24/6	..	4 18 0
Madras Elec. ..	6	8	46/–	..	3 9 7
Nigerian Elec. ..	10	12½	51/3	–1/6	4 17 3
PalestineElec."A"	6†	7†	37/6	+1/6	3 14 9
Perak Hydro-elec.	6	7	15/6	..	—
Tokyo Elec. 6% .	–	–	61½	+4	—
VictoriaFallsPower	15	19	6	..	3 3 4
Whitehall Inv.Pref.—		6	27/6	..	4 7 3
Equipment and Manufacturing					
Aron Elec. Ord...	10	15	55/–	..	5 9 1
Assoc. Brit. Eng.	8	12	47/6	–5/–	5 1 1

Company	Dividend Previous	Dividend Last	Middle Month's Price July 18	Rise or Fall	Yield p.c.
Equipment and Manufacturing *(Continued)*					£ s. d.
Assoc. Elec. :					
Ord.	10	15	93/–	+3/–	3 4 6
Pref.	8	8	46/3	..	3 9 3
AutomaticTel.&El.	12½	12½	70/–	–½	3 11 5
Babcock & Wilcox	12½	15	76/6	–½	3 18 6
Baldwin,H.J.(2/–)	10	20	11/6	–2/–	3 9 7
British Aluminium	8	10	50/6	..	3 19 4
B.I. Callender's ..		6⅔	44/6	–1/6	3 0 0
British Rola (2/–)	15	15	5/3	–1/–	5 14 4
BritishThermostat (5/–)	18½	23½	27/6	+1/6	4 5 6
BritishVac.Cleaner (5/–)	30	20	21/3xd	–1/6	4 14 1
Brush Ord.(5/–)..	10	4	7/9	–9d.	2 11 7
Burco (5/–) ..	20	35	27/–	–⅛	6 9 8
ChlorideEl.Storage	20	20	5½xd	+⅛	3 12 9
Christy Bros. ..	17½	17½	81/3	..	4 6 2
Cole, E. K. (5/–) .	20	20	23/6	–2/–	4 5 0
Cossor, A. C. (5/–)	12½†	25†	25/6	–½	4 18 0
Crabtree (10/–) ..	17½	17½	46/–	..	3 16 3
CromptonParkinson Ord. (5/–) ..	22½	22½	30/6	–5/3	3 14 0
De La Rue (5/–)	45	50	60/–xd	–9/–	4 3 4
Decca (1/–)	100	112½	53/9	–¼	2 2 0
E.M.I. (10/–) ..	8	8	24/6	–1/9	3 5 2
Elec. Construction	12½	12½	70/–	..	3 11 4
Enfield Cable Ord.	12½	7½	45/6	–9d.	3 5 10
English Electric .	10	10	64/6	–3/–	3 2 0
Ericsson Tel. (5/–)	20†	20†	47/6	+6d.	2 2 2
Ever Ready (5/–)	40	40	42/6	+2/–	4 14 0
Falk Stadelmann	7½	10	48/3	+2/–	4 3 0
Ferranti Pref. ..	7	7	37/–	..	3 15 8
G.E.C. Pref.	6½	6½	38/3	..	3 8 4
Ord.	17½	17½	96/3	–3/3	3 13 0
GeneralCable(5/–)	15	25	52/6	..	—
Greenwood&Batley	15	15	57/6	..	5 4 5
H.T.A. (10/–) ..	10	10	19/–	–1/–	5 5 3
Heatrae (2/–) ..	12½	12½	6/3	–⅛	4 0 0
Henley's (5/–) ..	20	20	27/–xd	..	3 14 1
4½% Pref. ..	4½	4½	26/6	..	3 4 4
Hopkinsons ..	20	22½	5½	..	3 18 2
Intl. Combustion (5/–)	32½	37½	55/–	–9/3	3 8 2
Johnson & Phillips	15	15	78/9	–⅛	3 17 4
LancashireDynamo	22½	22½	6½	..	3 12 0
Laurence,Scott(5/–)	12½	12½	13/6	–3d.	4 12 7
London Elec. Wire	7½	10	51/–	+1/–	3 18 6
Mather & Platt ..	10	11	55/–	–⅛	4 0 0
Metal Industries(B)	9	10	57/6	–2/–	3 9 6
Mid. Elec. Mfg. ..	30	35	9½	+¾	3 13 9
Murex	20	20	96/3	–⅛	4 3 0
Newman Ind.(2/–)	22½	22½	8/3	..	5 9 1
Plessey (5/–) ..	20	30	31/–	–9d.	—
Power Securities.	6	6	32/–	..	3 15 0
Pye Deferred (5/–)	25	25	30/–	–½	4 3 4
Radio & Tel. (2/–)	25	40	6/6	–6d.	—
Revo (10/–) ..	17½	20	55/–	+⅛	3 12 9
Reyrolle	12½	12½	83/9	–½	3 0 0
Scophony (5/–) ..	—	—	5/–	–6d.	—

(*Continued on page* 153)

* Proposed amount of British Electricity Stock to be allotted.
† Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price July 18	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (*Continued*)					£ s. d.
Siemens Ord. ..	7½	7½	35/6	−1/6	4 4 6
Strand Elec. (5/-)	12½	12½	12/9	−3d.	4 18 1
Switchgear & Cowans (5/-) ..	25	10	19/-	..	2 12 8
T.C.C. (10/-) ..	12½	15	36/3	..	4 2 6
T.C. & M. ..	10	10	52/6	−3/3	3 16 4
TelephoneMfg.(5/-)	9	9	13/6	−1/-	3 6 8
Thorn Elec. (5/-)	20	20	26/3	..	3 16 4
Tube Investments	22½	22½	7¼	+¼	3 2 3
Vactric (5/-) ..	Nil	Nil	17/-	−6d.	—
Veritys (5/-) ..	7½	2½	7/-	−2/3	1 15 8
WalsallConduits(4/-)	55	70	62/6	+5/6	4 9 7
Ward & Goldstone (5/-)	35	50	66/-	+6/-	3 15 9
Watford (2/-) ..	15	15	7/3	..	4 2 10
WestinghouseBrake	14	14	71/3	..	3 18 8
West, Allen (5/-)	7½	10	10/6	−3d.	4 15 3
Traction and Transport					
Brit.Elec.Traction:					
Def. Ord. ..	45	50	1385	−25	3 12 3
Pref. Ord. ..	8	8	195	+5	4 2 1
Calcutta Trams..	6½	7½	45/-	−½	3 6 8
Cape Elec. Trams	5	6	35/-	..	3 8 7

Company	Dividend Previous	Dividend Last	Middle Price July 18	Month's Rise or Fall	Yield p.c.
Traction and Transport (*Continued*)					£ s. d.
Southern Rly.:					
5% Prefd. ..	5	5	71½	−½	6 19 10
5% Pref. ..	5	5	118½	+1	4 4 5
T. Tilling ..	10	10	67/-	+6d.	2 19 6
West Riding ..	10	15	59/6	+6d.	5 1 4
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	143	−½	4 4 0
Def.	1½	1½	34	−1	4 8 3
Anglo-Portuguese	8	8	31/3	−3/3	5 2 5
Cable & Wireless:					
5½ Pref. ..	5½	5½	117½	−5	4 13 7
Ord.	4	4	158½	−19	2 10 6
CanadianMarconi$1	Nil	4 cts.	12/6	..	—
Globe Tel. & Tel.:					
Ord.	8½†	5†	45/-	−½	2 4 6
Pref.	6	6	34/6	..	3 9 7
GreatNorthernTel. (£10)	18	15	34½	..	4 7 0
Inter. Tel. & Tel.	Nil	Nil	16	+3	—
Marconi-Marine..	7½	7½	32/-	−1/9	4 13 9
Oriental Tel. Ord.	4	4	53/9	−2/-	—
Telephone Props.	6	6	21/6	..	5 11 7
Tele. Rentals(5/-)	10	10	13/-	−2/-	3 17 0

† Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from p.* 152)

then to be the chief requisites for the restoration of the works to their full capacity. At the present price the yield on the £1 shares works out at £3 11s. 4d. per cent.

Telephone Shares

From the point of view of market values, the performance of shares connected with telephone manufacturing has recently been below the average in the electrical markets. This year's telephone company accounts have on the whole reflected the drag imposed by shortages on efforts to accelerate production. Dividends have been well maintained, but in some cases it has taken substantial E.P.T. recoveries to uphold net earnings against a fall in trading profits. Although relatively subdued, however, the shares remain on a yield basis low enough to indicate confidence in their investment character.

Automatic Telephone Capital

Expansion of Automatic Telephone & Electric has been financed for many years out of ploughed-back profits at the expense of a liberal dividend policy. Sir Alexander Roger disclosed at last week's meeting that the financing of current business, which is larger in terms of output than at any time before the war, may now call for the issue of fresh capital unless the present level of prices tends to fall. Any such issue would probably be in the form of short-term redeemable stock. The statement by the chairman draws attention to the results of conservative finance on the consolidated balance-sheet. Capital and revenue reserves, at over £1 million, cover 87 per cent of the issued capital, while on the other side assets stand at figures far below their actual value. The keynote of the review is the vast amount of work to be done and the manifold hindrances to its completion. After declining this month from 75s. to 70s., the shares yield £3 11s. 5d. per cent on the 12½ per cent dividend.

Miscellaneous Matters

Holders of British Aluminium 4 per cent debentures are offered either repayment at 104 next December, or conversion by July 28th into a new 3 per cent redeemable stock at 100½, plus £3 10s. per cent in cash. The Palestine Electric annual report records continued expansion despite the local troubles. The dividend has been raised from 6 to 7 per cent, tax free. The Pye company's consolidated accounts show that the 25 per cent dividend is covered by group earnings equal to about 60 per cent on the deferred capital. The shares are 2s. 6d. lower on the month, at 30s. Scophony is calling an extra-ordinary meeting to deal with points raised by shareholders.

New South African Power Station.—Construction of a £3,000,000 power station in Pretoria is to be started next year. Four boilers estimated to cost £1,000,000 and two turbo-alternators costing about £400,000 have been ordered from England. Delivery is expected in 1950.—*Reuter.*

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

BRITISH Thomson-Houston Co., Ltd.—"Line-drop compensated voltage control circuits." 8422. May 26th, 1942. (589853.)

J. D. Cockcroft and J. Ashmead.—"Radio transmission and reception." 14056. August 27th, 1943. (589958.)

British Thomson-Houston Co., Ltd.—"Electric voltage control systems for interconnected power circuits." 20914. December 14th, 1942. (589854.)

1944

Marconi's Wireless Telegraph Co., Ltd.—"Optical projection apparatus." 3122. February 19th, 1943. (589961.)

A. F. Berry.—"Heating apparatus suitable for cooking purposes." 12379. June 29th, 1944. (589807.)

P. May (Robertshaw Thermostat Co.).—"Safety control systems for heating apparatus." 12820. July 5th, 1944. (589963.)

Franco-British Electrical Co., Ltd., and A. H. Brackensey.—"Display signs embodying electric discharge tubes." 14962. July 27th, 1945. (589865.)

Ace Electronics, Ltd., L. C. Welch, and R. J. Cook.—"Electric treatment of hair." 16303. August 14th, 1945. (589911.)

W. G. Johnston and C. S. Wright.—"Automatic tuning control systems for radio receivers." 17634. September 14th, 1944. (589867.)

Western Electric Co., Inc.—"Method of and apparatus for plating surfaces with tungsten, chromium, or molybdenum." 18412. September 30th, 1943. (589966.)

C. C. Seckham and C. P. Seckham.—"Magnetically-operated percussive tool." 18975. October 4th, 1944. (589816.)

Revo Electric Co., Ltd., A. E. Felton and A. Crawford.—"Service boxes for electric current supply." 20017. October 17th, 1944. (589818.)

W. C. Fairweather (Singer Manufacturing Co.).—"Portable electric drills and like tools." 21292. October 31st, 1944. (589914.)

Landis & Gyr Soc. Anon.—"Device for use on recording apparatus having record paper unwinding from a roll." 22377. November 16th, 1943. (589823.)

G. M. Horvitch.—"Telephone relaying and amplifying means for the aid of deaf or like persons." 23748. November 28th, 1944. (589918.)

Tweedales & Smalley (1920), Ltd., and E. G. Smalley.—"Electric stop motion for carding engines." 25866. December 24th, 1944. (589878.)

Marconi's Wireless Telegraph Co., Ltd.—"Gain control circuit for radio receivers." 26119. December 30th, 1943. (589968.)

1945

F. J. Allen, J. E. Wilson and E. J. Davenall.—"Mounting of the doors of refrigerators, ovens, stoves, or the like." 604. January 6th, 1945. (589828.)

H. Meadows, Ltd., and W. W. Hamill.—"Means for sealing the adjusting devices of thermostatically-operated apparatus." 1387. January 17th, 1945. (589970.)

Sylvania Electric Products, Inc.—"Oxidation of stainless steel." 3221. October 18th, 1944. (589881.)

R. E. H. Carpenter.—"Mountings for electrical contacts." 5593. March 6th, 1945. (589885.)

Radio Corporation of America.—"Signal translating systems." 6195. March 29th, 1944. (589834.)

Sangamo Weston, Ltd., and G. E. Weston.—"Coin operated devices." 6734. March 16th, 1945. (589888.)

Metropolitan-Vickers Electrical Co., Ltd., G. H. Fletcher and A. Mandl.—"Dynamo-electric machines." 6865. March 19th, 1945. (589840.)

Carbide & Carbon Chemicals Corporation.—"Sealed electric cable." 6935. April 11th, 1944. (589955.)

Standard Telephones & Cables, Ltd., R. M. Barnard, M. J. Moroney, and E. Woolterton.—"Potted electric condensers." 7366. March 23rd, 1945. (589891.)

A. J. Senior.—"Electrically heated soldering irons." 7539. March 26th, 1945. (589892.)

General Electric Co., Ltd., and D. C. Espley.—"Push-pull thermionic valve amplifiers." 7571. March 26th, 1945. (589845.)

A. Marsden.—"Domestic heating apparatus." 8003. March 29th, 1945. (589846.)

Electric Construction Co., Ltd., and J. C. Milne.—"Electric switching apparatus operated by machine parts or other moving members." 8006. March 29th, 1945. (589931.)

A. J. Curnow.—"Table or bracket electric lamp." 8071. March 30th, 1945. (589950.)

International Resistance Co.—"Resistor construction." 8073. April 5th, 1944. (590013.)

F. Heaton, F. R. Heaton and A. M. Woodley.—"Contacts for electric switches." 8110. March 30th, 1945. (589897.)

Marconi's Wireless Telegraph Co., Ltd.—"Diversity receiving system." 8114. March 30th, 1944. (589898.)

Allmanna Svenska Elektriska Aktiebolaget.—"Protective device for electric installations according to the impedance principle." 8167. May 3rd, 1944. (589933.)

South Wales Switchgear, Ltd., and S. Farrer.—"Contacts for electrical switching devices." 8190. April 3rd, 1945. (589934.)

Rowe Bros. & Co., Ltd., and P. Hanson.—"Battery connectors." 8264. April 4th, 1945. (589936.)

B. Jablonsky.—"Insulated conductors." 8297. April 4th, 1945. (589938.)

Metropolitan-Vickers Electrical Co., Ltd., and A. Mandl.—"Fluorescent lighting systems." 8299. April 4th, 1945. (589939.)

P. A. H. Mossay.—"Controlling means for electric hoisting and other motors." 8474. April 5th, 1945. (589946.)

Standard Telephones & Cables, Ltd.—"Metal contact rectifier." 8552. April 24th, 1944. (589952.)

W. T. Henley's Telegraph Works Co., Ltd. and F. A. Barker.—"Reel for wire, cable and the like." 8604. April 6th, 1945. (589990.)

British Insulated Cables, Ltd., London Passenger Transport Board, T. C. Broom and T. Wilkinson.—"Cross-overs for overhead conductor systems for electric traction." 8605. April 6th, 1945. (589991.)

B. J. Williams.—"Voltage regulation for electric generators, rotary transformers, and the like." 8612. April 6th, 1945. (589992.)

J. D. Lowe.—"Electrically operated mixing devices and other small reciprocating machines and actuating mechanism therefor." 8684. April 9th, 1945. (589999.)

S. J. Smith.—"Electrical liquid level gauges." 8715. April 9th, 1945. (590017.)

Metropolitan-Vickers Electrical Co., Ltd., and W. T. Gray.—"Grid-type electric resistance equipments." 8724. April 9th, 1945. (590018.)

British Thomson-Houston Co., Ltd.—"Multiple flash lamp devices." 8726. April 12th, 1944. (590019.)

Hewittic Electric Co., Ltd., and L. J. Martin.—"Supply systems operating with mercury arc rectifiers and supplying loads capable of regenerative operation." 8744. April 9th, 1945. (590022.)

English Electric Co., Ltd., and M. A. B. Landers.—"Terminals for electric cables, wires, and the like." 8781. April 9th, 1945. (590028.)

Cinema-Television, Ltd., and R. B. Head.—"Methods of forming insulating films." 8888. April 10th, 1945. (590039.)

Ruston & Hornsby, Ltd., and P. Grant.—"Electromechanical power transmission systems." 8939. April 11th, 1945. (589953.)

Cathodeon, Ltd., and F. H. Townsend.—"Apparatus for the measurement of high vacua." 8954. April 11th, 1945. (Cognate application 11675/46.) (590046.)

Lumalampan Aktiebolag.—"Electric discharge tube." 8960. April 27th, 1944. (590048.)

A. Savary.—"Sockets for electric lamp bulbs." 8988. April 19th, 1944. (590058.)

Municipal Reports

Belfast.—Since 1942 the annual surplus profits of the undertaking have averaged £78,456, the amount for the year just closed being £110,943. The city electrical engineer and general manager (Mr. W. J. McC. Girvan) in his report, refers to the beneficial results of employing these profits entirely for the purposes of the undertaking. A number of tariff concessions have been recommended. Gross revenue last year increased by £20,362 to £1,573,763, while working expenditure advanced by £25,673 to £1,199,816. Capital charges, etc., were however down by £62,391. The report says assurance has been obtained that the war damage position of the undertaking will not be prejudiced in any way by the passing of the Electricity Bill in Britain.

Excluding 158·3 million kWh bulk supplies the Department last year sold 244·4 million kWh, an increase of 12·6 million, in spite of shipyard supplies declining by 4 million kWh. At the Harbour power station 253·4 million kWh was generated, a decrease of 10 per cent; 208·4 million kWh was purchased from the Government's Ballylumford station (44 per cent increase). It is hoped that the 30,000-kW extension at the Harbour station now in hand will be ready in the spring of 1949.

During the year major engineering schemes were approved for the development of the 33-kV primary transmission system, the 6·6-kV and l.v. systems, and supplies to trolley-bus routes on the northern side of the city. Work has proceeded on the change-over from d.c. to a.c. For these schemes and consumers' services loans aggregating £834,377 were sanctioned during the year. At the end of March there were 1,390 outstanding applications for supplies (excluding housing estate demands which have been met as required).

Sunderland.—In his annual report for the past year the borough electrical engineer and general manager (Mr. W. A. Royle) estimates that the fuel crisis resulted in a reduction in sales of approximately a million kWh and a loss of revenue of £8,300. Nevertheless, the total quantity of electricity sold during the year set up a new record at 105·4 million kWh, comparing with 97·2 million in 1945-46 and 67·4 million in 1938-39. Apart from a small decrease in power (0·4 per cent) there was an expansion in all categories of supply. The undertaking itself generated 148·0 million kWh compared with 150·9 million in the previous year.

Gross revenue amounted to £516,635, compared with £466,367 in 1945-46, working costs rising from £354,103 to £423,068. The net trading surplus was £32,690 (£47,194) of which £29,111 has been applied to capital works. The average price received fell slightly from 1·021d. to 1·003d.; in 1938-39 the figure was 0·988d. At March 31st last the number of consumers was 29,028 compared with 28,434 a year before.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Dundee.—August 13th. Corporation. Multicore h.v. and l.v. cables. (July 11th.)

East Ham.—July 31st. Electricity Department. Outdoor transformers. (July 18th.)

Farnborough.—August 16th. Electricity Department. Meters and 1,000 kVA transformer. (See this issue.)

Halifax.—August 4th. Borough Housing Committee. Electrical work in connection with 132 houses at Cousin Lane (West side), section 2. Borough engineer, Crossley Street.

Kirkcaldy.—July 28th. Town Council. Electrical work at extensions to the Forth Park Maternity Hospital. W. Williamson & Hubbard, architects, Royal Bank Buildings.

Manchester.—August 27th. Waterworks Committee. Fifteen sets of electrically-driven pumps. (See this issue.)

Middlesbrough.—August 25th. Tees Valley Water Board. Electrically driven centrifugal pumping plant in connection with Ormesby reservoir and pumping station. T. S. R. Winter, manager to the Water Board, Corporation Road.

Newport (Mon.).—August 12th. Corporation. Rewiring of the electrical installation in the central library and museum and art gallery. (See this issue.)

Skelton and Brotton.—August 18th. Electricity Department. Two 3-phase static transformers. (July 18th.)

Swanage.—August 4th. U.D.C. Electrical installation in twenty-six Council houses. (See this issue.)

Orders Placed

West Hartlepool.—Corporation. Accepted. Eight 500-kVA single-phase transformers (£3,560).—Bryce Electric Construction Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alloa.—Extensions for Scottish Central Glass Works (£9,200); manager.

Alnwick.—Factories for the Newsham Clothing Co., Ltd., and J. Lowrie & Co., Ltd.

Alston.—Second year's housing programme for the U.D.C.; Graham & Roy, architects, 6, Paternoster Row, Carlisle.

Ayrshire.—Crematorium scheme for local authorities; burgh surveyor, Ayr.

Bakewell.—Electrification of Rutland Works for R. Smith & Sons.

Bedlington.—Houses (40) for key workers; W. Hall, U.D.C. surveyor.

Belper.—Works extensions; Blount & Co., Ltd., Hosiery Works, Spencer Road.

Bishop Auckland.—Glass factory at Evenwood for L. Greenberg & Sons, Old Swan, Liverpool.

Blackpool.—Houses (33), Collins Avenue; R. Fielding & Sons, builders, Stanhope Road Works.

Bolton.—Three-storey block for shops, Bridge Street and Deansgate; Magee, Marshall & Co.

Bromsgrove.—Extensions, Forelands, for babies' ward; Royal Cripples Hospital Board, Broad Street, Birmingham, 15.

Chester.—Extensions at Nurses' Home at Royal Infirmary; Ashley & Newman, architects, 3, Verulam Buildings, London, W.C.1.

Clydebank.—School (£75,000); burgh architect.

Coventry.—Houses at Tennyson Road, Broad Lane, Jobs Lane and Meredith Avenue; D. E. E. Gibson, city engineer, 1a, Warwick Row.

Dalkeith.—School buildings for Midlothian County Council; county clerk.

Darlington.—Factory, McMullen Road, for Duralum Castings, Ltd.; North-Eastern Trading Estates, Ltd., Low Fell, Gateshead.

Dewsbury.—Houses (154), maisonettes and shopping centre, Thornhill; borough engineer.

Durham.—Additions, Saddler Street, for Durham County Advertiser and General Printing Co., Ltd.; Mr. Elgey, architect, 7a, North Bailey.

Edinburgh.—Extensions for Scottish Motor Traction Co.'s sales and services premises at Musselburgh (£5,000); manager, S.M.T.

Exeter.—Rebuilding the West of England Institution for Instruction and Employment of the Blind, St. David's Hill; Colonel H. D. Goldsmith, president.

Gateshead.—Partial rebuilding of large stores, Jackson Street, for E. Shephard, Ltd.; R. W. Bell & Co. (Builders), Ltd., New Mills, Barrack Road, Newcastle-on-Tyne.

Hexham.—Fifty "Airey" type houses and 14 brick houses; U.D.C. surveyor.

Houghton-le-Spring.—Factory on new trading estate for North-Eastern Trading Estates, Ltd.; W. Norman, builder, West Lane, Chester-le-Street.

Keighley.—Modern store premises, Woodhouse; secretary, Keighley Industrial Co-operative Society, Ltd., Brunswick Street.

Kilmarnock (Ayrshire).—Shops for Corporation (electric lighting and heating installation); James Hay & Steel, 13, West George Street, Kilmarnock.

Lancaster.—Dining room and kitchen for Royal Grammar School; G. Noel Hill, county architect, County Offices, Preston.

Liverpool.—Factory, Kirkby Trading Estate, J. E. Fleming, Ltd.; Roberts & Sloss, Ltd., builders, Baker Street.

Manchester.—Rebuilding works, Forge Lane, for Richard Johnson & Nephew, Ltd.; J. Gerrard & Sons, Ltd., builders, Swinton.

Additions to Nurses' Home, Mill Street, for Ancoats, Hospital Board; W. Thorpe & Sons, Ltd., builders, Chester Road.

Middlesbrough.—Five new factories at East Middlesbrough for the North Eastern Trading Estates; Matkin & Hawkins, Barclays Bank Chambers, Sunderland.

Middleton.—Central kitchen, (1,500 meals daily), Cleworth Road; G. Noel Hill, county architect, County Offices, Preston.

Newquay.—Houses (64), Mayfield Road, for U.D.C.; C. W. Walters, Council Chambers.

North Riding.—New Ryedale secondary school for the E.C.; county architect, County Hall, Northallerton.

Rochdale.—Extensions, café and restaurant, 82-84, Drake Street, for Burney's, Ltd.; R. & T. Howarth, Ltd., builders, Crosfield Works.

St. Helens.—Three factories; North Western Industrial Estates, Ltd., Standishgate, Wigan.

Saddleworth.—Houses (42), Delph estate (£56,365), for U.D.C.; J. H. Tyson & Co., Ltd., builders, Oldham.

Salford.—Works, Bury New Road, for Pearlite Box Co., Ltd.; Wm. Townson & Sons, Ltd., builders, Park Hill Street, Bolton.

Sheffield.—"Duke" permanent houses (60), for T.C. (£82,092); Amalgamated Building Corporation.

South Shields.—Ice cream factory, Laygate Street, for Minchella & Co.; Page, Son & Hill, architects, 75, King Street.

Stockport.—Primary School, Broadstone Hall, for E.C.; Cruickshank & Seward, architects, 16, Princess Street, Manchester, 1.

Urmston.—Houses (39) and flats (2), Davyhulme, for U.D.C.; J. Maunders & Sons, Ltd., builders, 554, Barton Road, Stretford.

Wallsend.—Additions, Stephenson Street, for the Tyne Plywood Works, Ltd.; Cussins (Contractors), Ltd., Gosforth, Northumberland.

Printing works for Doig Bros., Newcastle; C. S. Errington, 46, Grainger Street, Newcastle.

Westhoughton.—Houses (44), Daisy Hill, Hindley Road, for U.D.C.; Law & Grimshaw, surveyors, Bank Chambers, Atherton.

American Power Position

SPEAKING at the recent annual convention of the Edison Electric Institute, Mr. G. C. Neff, president, referred to the growth of demand for electrical services. According to the *Edison Electric Institute Bulletin*, Mr. Neff said that the demand outraced estimates, and the December, 1946, peak load for the nation at large and the kWh output of that month were well above the highest wartime figures; the present demand continued considerably ahead of last year.

Several factors were contributing to this sharp growth of peak load. Industrial activity was at a high level, but many manufacturing establishments were operating only one shift per day, five days per week, whereas during the war most of them operated around the clock. This had produced sharper demands on the power systems. The electrification of industry was accelerating and its influence on the growth of demand for electric power would be felt for many years ahead. The ratio of kWh to man-hours in the manufacturing industry (exclusive of aluminium and magnesium production, which had a high ratio of kWh to man-hours) had increased by 11 per cent since 1939. Another factor was that the cost of electric service compared to the cost of living was much lower than before the war.

This rapid growth sharply reduced the industry's margin of reserve generating capacity, and the margin over peak load in December, 1946, was only half as large as during the heaviest demands of the war period, and in some localities the load actually caught up with the total available capacity.

The outlook for the peak period next winter was for somewhat smaller reserves than obtained in December, 1946, but the generating capacity should meet the demands throughout the nation, with possibly a few minor exceptions for short periods. In 1948, the added capacity should exceed the expected load growth by a considerable amount but would still leave fairly slim margins of spare and reserve capacity in some areas. In 1949 there would be a further substantial gain in reserve capacity, but it was expected that it would take three or four more years beyond that for the companies to re-establish reserve margins such as their operating forces liked to have at their disposal.

Privately Owned Utilities

A report by the Federal Power Commission states that the larger privately owned electric utilities last year sold 162,665 million kWh to ultimate consumers, compared with 164,249 million in 1945. Sales to residential and commercial consumers, at 30,930 million and 25,791 million kWh, showed increases of 13·8 and 15·0 per cent respectively. On the other hand industrial supplies (84,564 million kWh) decreased by 7·9 per cent. Aggregate revenues rose from $3,171 million to $3,288 million and net profits from $534 million to $645 million.